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HOUSING, 1973

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ABSTRACT:	This study identifies and briefly analyzes socio-economic and housing trends for Alachua County, identifying such variables as family income, population growth, population per household, housing by type and tenure and housing conditions. Projections are made of housing needs, by type and tenure, for Alachua County and the municipalities therein, as well as the cost of housing and the ability of the potential consumer to pay for housing. An environmental discussion is included regarding site location criteria, covering such topics as the physically limiting restraints placed on the degree and location of subdivision developments by topography, climate, ecology, soils, drainage and water and sewer utilities.

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Introduction & Summary

This housing study covers several aspects of determining future housing needs and some environmental criteria to be considered in housing location. Beginning with a brief socio-economic analysis of Alachua County, the study proceeds to identify past and existing housing trends and conditions. The cost of new housing construction and the capabilities of the consumer to pay for housing are projected through 1985, as are the housing needs, by type and tenure.

Following the discussion of future housing needs, a section is devoted to identifying the physical constraints on subdivision development. Housing location criteria, based on a number of physical limitations, are discussed. Also considered are the constraints which water and sewer utilities place on the degree and location of residential development.

As the population increases and the needs and demands for housing become greater, planning will play a significant role in assuring that these needs will be met. Studies such as this will provide a valuable reference through which new housing construction can be compared with anticipated needs. The environmental considerations outlined in this study will also provide an important checklist to assist in assuring that land areas are properly developed.

The major findings of this report are summarized below.

A. Housing Trends and Needs

1. The total number of housing units increased 53% from 1960 to 1970, from 21,933 units to 33,538 units.

2. Mobile home units increased 204% from 1960 to 1970, from 672 units to 2,046 units.

3. Multi-family units increased 147% from 1960 to 1970, from 3,319 units to 8,203 units.

4. The number of housing units having 1.01 or more persons per room (a measure of over-crowding) declined from 2,796 units in 1960 to 2,447 units in 1970, a decrease of 12.5%.

5. The typical residential housing unit, defined as having 3 bedrooms, approximately 1,200 square feet of living space, and on a standard 100' by 100' lot, cost approximately $25,000 in 1973.

6. In 1970, 15.3% of all families in Alachua County had incomes below the poverty level established by the Federal Interagency Committee. Furthermore, 22.4% of all households were below the poverty threshold.

7. It is estimated that in 1973 51.75% of the families in Alachua County cannot afford new housing costing greater than $24,000. The corresponding figure for Black families is 81.34%. Furthermore, it is estimated that 31.75% of the families in the county cannot afford housing costing greater than $16,000. For Black families the figure is 62.00%.

8. It is estimated that approximately 16.25% of all families and 39.34% of Black families in Alachua County can not afford monthly housing payments of greater than $105 in 1973. 12.0% of all families and 31.34% of Black families cannot afford monthly housing payments of $85.

9. Revised population estimates place Alachua County's population at 127,872 in 1975, 145,111 in 1980, and 165,432 in 1985.

10. The total number of households in Alachua County is projected to be 38,583 in 1975, 44,810 in 1980, and 51,607 in 1985.

11. The total number of housing units needed for Alachua County is projected to be 41,924 in 1975, 48,689 in 1980, and 56,074 in 1985.5.

12. The cost of a typical residential unit in Alachua County is expected to increase 72% betweem 1973 and 1985.

13. The median family income in Alachua County is estimated to increase 28% between 1973 and 1985, from an estimated $11,638 in 1973 to an estimated $14,844 in 1985. Median Black family income is estimated to increase by the same percent from an estimated $6,262 in 1973 to an estimated $7,986 in 1985.

14. It is projected that by 1985, 11.25% of all families and 30.00 % of all Black families in Alachua County will be unable to afford housing costing greater than $10,000. 38.75% of all families and 69.0% of Black families will be unable to afford housing above $24,000.

15. It is projected that by 1985 11.25% of all families and 30.00% of all Black families will be unable to afford monthly housing payments exceeding $105, at maximum. 8.50% of all families and 24.00% of all Black families will be unable to sustain a monthly housing payment exceeding $85, at maximum, without some type of housing assistance.

B. Site Location Criteria

The desirable features for location of a subdivision site should include as many of the following items, (realizing, of course, that it will probably not be possible to find one site that meets all of these criteria):

1. An adequate groundwater or surface water supply not subject to excessive pollution that can be developed into a satisfactory supply at an accessible and convenient location on or near the site, if an adequate public water supply is not available.

2. A permeable soil that will readily absorb rainwater and permit the disposal of sewage and other wastewater by conventional subsurface means is most desirable, if not essential, for the smaller establishment where public sewerage is not available. Such soil will contain relatively large amounts of sand and gravel, perhaps in combination with some silt, clay, broken stones, or loam. The groundwater table should not be closer than four feet of the ground surface at any time and there should be a porous earth cover of not less than four or five feet over impervious subsoil or rock. A suitable receiving stream or land area is needed if a sewage treatment plant is required.

3. Land to be used for housing or other structures must be well above flood or high-water level. There should be no nearby swamps.

4. Elevated, well-drained, dry land open to the air and sunshine part of the day, on gently sloping, partly wooded hillsides or ridges, should be available for housing and other buildings. The cleared land should have a firm, grass-covered base to prevent erosion and dust. A slope having a southern or eastern exposure protected from strong winds on the north and west is desired.

5. The area of the property should be large enough to provide privacy, avoid crowding, accomodate a well-rounded program of activities, and allow for future

expansion. The property should be accessible by automobile and bus, and convenient to airports, super--highways, railroads, if needed, and recreation facilities.

6. A satisfactory area should be available for bathing and swimming and other water sports at recreational sites. A clean lake, river, or stream or an artificial swimming pool will suffice if adequately maintained.

7. Noxious plants, poisionous reptiles, harmful insects, excessive dust, steep cliffs, old mine shafts or wells, dangerous rapids, dampness, and fog should be absent. All this is not usually possible to attain; however, the seriousness of such hazards should be considered.

8. A public water supply, sewerage system, and solid waste disposal system, if available and accessible, would be extremely desirable.

9. For residential development, electricity, gas, and telephone service; a sound zoning ordinance and a land use plan that provides for and protects compatible uses; fire protection; and modern building construction and houlsing codes vigorously enforced by competent people should all be assured.

10. Air pollution, noise, and traffic problems from adjoining areas should not interfere with the proposed use.

I

HOUSING NEEDS

- Socio-economic Analysis
- Housing Profiles
- Housing Projections

SCOPE

Any study attempting to anticipate a community's future housing needs must begin with an accurate assessment of the relationships between the community's existing social, economic and housing conditions. This assessment would consist of a socio-economic profile, composed of such data as presented in the following outline:

I) Population
   A) Total
   B) By Race
   C) By Age
   D) By Sex
II) Family Income Levels - Distributions
   A) Total
   B) By Race
III) Housing, by Tenure (Owner-occupied, Renter-occupied, Vacant)
   A) Median Value (Owner-occupied)
   B) Median Rent (Renter-occupied)
IV) Housing
   A) By Type (Single-family, Multi-family)
   B) By Quality (Sound, Deteriorating, Dilapidated)
V) Housing
   A) By Type and Tenure
   B) By Race and Sub-area (Census tracts and/or enumeration districts)
VI) Overcrowding (1.01 persons per room--Census Bureau)

The above outline is certainly not all-inclusive, but serves to illustrate what data go into a socio-economic profile. Greater depth can be given to the profile, and consequently, a better understanding of the dynamics of the community, if the data can be collected over a span of years, so that time comparisons can

be made. Such data would aid in establishing trends upon which projections could be based. However, trend data may not be available, especially in smaller communities not ordinarily covered by the Census Bureau reports, and limitations of time, manpower, and money may not allow for the collection of trend data. In these situations, projections must be based upon available current year data and scholarly assumptions.

Accordingly, this study will proceed in the following manner:

1) utilize census data and the Population and Economic Study (1972, N.C.F.R.P.C.) to display and analyze the socio-economic profile of Alachua County, and of each municipality within the county, where data availability allows;

2) employ census data, the Housing Conditions Study (1972, N.C.F.R.P.C.) and some survey data to review housing conditions (quantity and quality) and to relate to socio-economic conditions as determined by 1) above, identifying user groups;

3) use data from existing studies to estimate the number of existing units which warrant clearance or rehabilitation by section of the county;

4) assess past and present housing conditions and borrow the population projections from the Population and Economic Study to project gross housing needs, by type and tenure;

5) use interview data to estimate future housing production by type, estimating cost of purchase or rent levels as well;

6) use the data from 3), 4) and 5) above to estimate unmet housing demand; and

7) project income and, subsequently, demand for housing by user group and anticipated need for subsidized housing, at the county level.

DEFINITIONS

The following definitions will serve to clarify the terminology used in this study:

Contract Rent is the montly dollar rent agreed upon or (for vacant units) the monthly dollar rent asked at the time of enumeration, regardless of any furnishings, utilities, or services that were included. Respondents were to indicate monthly contract rent to the nearest dollar. (If rent was paid by the week or some other time period, respondents were to indicate the amount and the time period so that their monthly contract rent can be entered by census employees.)

Gross Rent is calculated for renter-occupied units rented for cash rent (with the exclusions noted above for rent). It represents the contract rent plus the average monthly cost of utilities (water, electricity, gas,) and fuels, to the extent that these are paid for by the renter (or paid for by a relative, welfare agency, or friend) in addition to the rent. Gross rent thus eliminates differentials which result from varying practices with respect to the inclusion of utilities and fuel in contract rent.

Gross Rent as Percentage of Income is the yearly gross rent (monthly gross rent multiplied by 12) expressed as a percentage of the total (gross) income in 1969 of the family or primary individual.

Mean is the calculated, average value.

Median is the calculated value which divides a distribution in half.

Socio-Economic Profile is a series of tabulations of various social and economic characteristics of a community which give an indication of the social conditions existing within that community. These characteristics would include population composition, income, occupations, employment, education, and others. Such data are usually available from the Census publications, local agencies and research groups, and can also be collected by field surveys. This data can be analyzed at the community level, at larger levels, such as the county, region or state level, or at the smaller levels of sub-areas within a community.

Value is the respondent's estimate of how much the property (house and lot) would sell for if it were for sale.

A Sound Housing Structure is one which has no defects, or possibly slight defects which are repaired as a part of normal and adequate maintenance on a structure. Examples of such defects are lack of paint, slight damage to porch or steps, inadequate mortar between bricks or other masonry, small cracks in walls, broken gutters or downspouts.

A Deteriorating Housing Structure is one that requires more repair than would be provided in the course of regular maintenance. Housing in this category generally has one or more defects that must be corrected, if the structure is to continue to provide adequate shelter. Examples of a deteriorating structure are open cracks in exterior members, rooted, loose or missing materials on the structure, shakey or unsafe porch, broken or missing windowpanes, all of which would render the structure no longer adequate shelter from the elements. Such defects are signs of neglect which lead to serious structural deterioration or damage, if not corrected.

A Dilapidated Structure is one that does not provide adequate shelter and is a detriment to the health, safety or well-being of the occupants. Housing in this category will have one or more critical defects of such magnitude that they require considerably repair or rebuilding. Some structures are now dilapidated because of inadequate original construction. These defects are either so critical or widespread that the structure should be extensively repaired, rebuilt, or demolished.

A Housing Unit is a house, an apartment, a group of rooms, or a single room, occupied or intended for occupancy as separate living quarters. Separate living quarters are those in which the occupants do not live and eat with any other persons in the structure, and which quarters have either (1) direct access from the outside of the building or through a common hall, or (2) complete kitchen facilities for the exclusive use of the occupants. The occupants may be a single family, one person living alone, two or more families living together, or any group of related or non-related persons who share living arrangements (except in group quarters). Both occupied and vacant housing units are included in the housing inventory, except that mobile homes, trailier, tents, etc., are included only if they are occupied.

A Household consists of all the persons who occupy a housing unit. By definition, therefore, the count of occupied housing units is the same as the count of households.

Persons Per Household is computed by dividing the population in housing units by the number of occupied housing units. Since by previous definition the count of occupied housing units is equivalent to the count of households, population per occupied housing unit is equivalent to persons per household.

Socio-economic Analysis

POPULATION CHANGE

A review of several socio-economic variables for Alachua County from the 1950 Census to date, and a comparison of this data with similar data at the state level, reveal a number of significant trends which are pertinent to anticipating future housing needs. The first of these trends to consider regards population growth, as depicted in Table 1.

Table 1
Population Growth 1950-1970
Alachua County and the State of Florida

	1950	1960	1970	%change 1960-70
Florida	2,771,305	4,951,560	6,789,443	37.1
Alachua County	57,026	74,074	104,764	41.4

While it is evident that Alachua County has experienced a fairly large and significant growth rate over the past 20 years, the county's growth rate does not parallel that of the state, with the possible exception of the 1960-1970 decade where the county's rate was actually higher. Several explanations for this dissimilarity of growth rates center on a comparison of growth patterns and of the components of population change, specifically natural increase and net migration. Natural increase is determined by subtracting the number of deaths from the number of live births; net migration is the number of people migrating into an area minus the number migrating out of the area. In the state, population change due to natural increase, has steadily declined since 1870, accounting for less than half of the state's growth in successive decades since 1920. Conversely, population growth due to migration has accounted for increasingly large proportions of total growth

since 1900, actually reaching approximately 60% during the 1920-1930 decade, and attributing for close to 75% of total growth since 1950.

Alachua County has not experienced a growth due to such high proportions of in-migration. To the contrary, as Table 2 explains, natural increases accounted for almost 70% of the population growth as recently as in the 1950-1960 decade. Only in the last ten years has migration explained more than 50% of the population changes for the county. What may be more significant is not that migration accounted for 54% of change since 1960, but that the proportion of change attributable to migration has increased by two thirds, from 32% to 54%. The proportion due to natural increase has concomitantly decreased by one-third, down from 67% to 45%. In the event that this trend should continue, it is important to identify the specific components of this migration into the county to determine what

Table 2

Components of Population Change

The State of Florida and Alachua County

	1950-1960		1960-1970	
	State	County	State	County
Total Population Change	2,180,255	17,048	1,837,883	30,690
Change Due to Natural Increase	564,255 (25.9%)	11,532 (67.6%)	511,883 (27.9%)	13,972 (45.5%)
Change Due to Migration	1,616,000 (74.1%)	5,516 (32.4%)	1,326,000 (72.1%)	16,718 (54.5%)

Source: 1950, 1960 and 1970 Census Publications

type of people--types here referring to sex, age, race and occupation, family or non-family--are moving into the area. Once an understanding of the nature of change and migration is developed, it will be easier to anticipate the housing needs of this population.

AGE AND SEX

The initial impact of population growth due to migration is reflected in the age distribution within the county, as graphically illustrated in Figure 1. These sex-age profiles are designed to show the relative distribution of ages within a population, stratified by sex. Following the profiles from 1950 to 1970 suggests several items of significance.

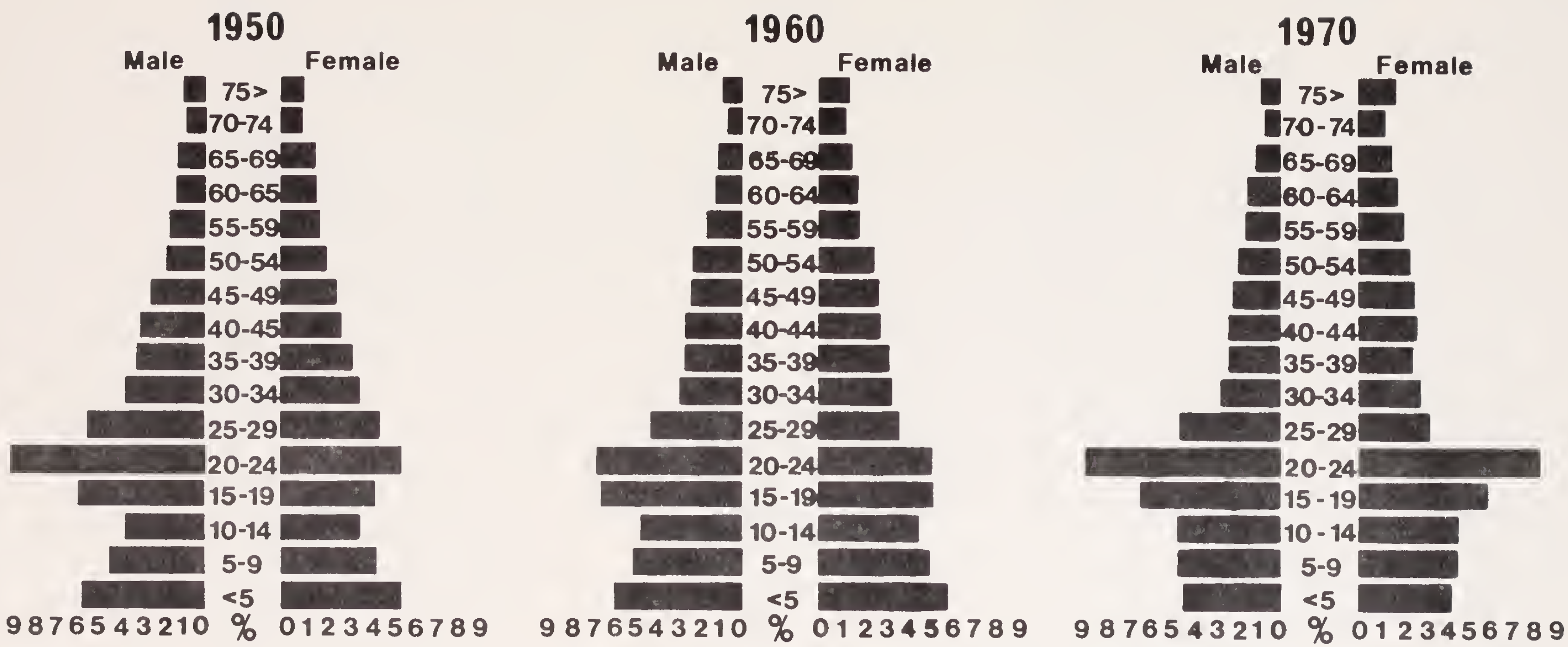
1) The proportion of the population 65 years and older has remained fairly constant since 1950, although, as the total county population increased, so too did this age group increase in absolute numbers.

2) While the proportion of the population age 65 and older has remained fairly constant, within that age group, women are more numerous than men. This reflects a national trend, as a Census Bureau profile of people at these ages shows, indicating that at the national level in 1970 there were 722 men for every 1,000 women, and the gap is expected to widen further in the future.

3) The percent of the population under the age of five has declined since 1960 from 11.4% to 8.4% in 1970.

4) During the same time period, the age group 15-24 has increased from 23.4% to 28.9% of the population.

While the state has experienced a significant increase in the size of the population ages 65 and older, the proportion of the county's population falling in this age group has remained relatively constant since at least 1950, at approximately 6.0%. If the state is generally considered an attractive place to retire, Alachua County apparently is not the most preferred area within the state. It seems reasonable to assume that any change in the size of the population



Age-Sex Distribution In Alachua County

FIGURE 1

within this age group will parallel a change in the total county population. It can be further assumed that, within this age group, women will continue to outnumber men, with the numerical gap widening in the future.

RACE

Having briefly examined population change at the gross level, some of the components of this change should be considered at a more specific level. Examining the figures in Table 3, it becomes apparent that, although non-whites have increased in terms of absolute numbers in the county, the proportion of the non-white population is steadily declining.

Table 3
Non-White Population
Alachua County
1950-1970

Year	Non-White Population	Percent of Total County Population
1950	16,551	29.0
1960	19,492	26.5
1970	21,563	20.6

The further detail given in Table 4 points out that non-whites are actually migrating out of the area, and have been doing so since the 1950-60 decade. This is perhaps reflective of a national trend where non-whites, particularly young non-whites at the verge of beginning to establish their households, migrate out of the predominately rural south to the larger urban areas in other regions offering greater economic opportunities.

Table 4
Net Migration of Non-Whites
Alachua County
1950-1970

	1950		1960		1970
Population	16,551		19,492		21,563
Natural Increase		3,758		3,775	
Expected Population Due to Natural Increase			20,309		23,267
Net Migration			-817		-1,704

The trend of the non-white population declining as a proportion of the total population is expected to continue, and it is predicted that by 1985 only 14.5% of the population will be non-white.

SPATIAL DISTRIBUTION

Closely related to the sex-age-race component is the spatial distribution of the population within the county. What is sought here is to identify trends in patterns of settlement and to attempt to establish some causal relationships between these patterns and other socio-economic variables. Through such an exercise, it should be easier to anticipate the continuation or cessation of trends and, consequently, be in a better position to anticipate future housing needs and demands. At this point, the concern is not for where within a municipality people locate, but rather in which municipality people tend to congregate. Accordingly, it is interesting to see that Alachua County, similar to the state and the nation, has undergone a shift in population from the rural areas into the urban areas, specifically the Gainesville Urban Area.

Table 5

Urban-Rural Breakdown

U.S.A., Florida and Alachua County

1960-1970

Year	U.S.A. Percent		Florida Percent		Alachua County Percent	
	Urban	Rural	Urban	Rural	Urban	Rural
1950	59.6	40.4	65.5	34.5	47.1	52.9
1960	69.9	30.1	73.9	26.1	49.6	50.4
1970	73.5	26.5	80.5	19.5	68.8	31.2

Source: Census Publications, 1950, 1960, 1970

It is significant to point out that the rate of population shift into the urban areas is higher in Alachua County than for either the state or the nation as a whole. In the 1950 and 1960 Census tabulations, Alachua County had only one area classified as an urban area, Gainesville. In 1970, High Springs was added to this classification, as were certain fringe areas of Gainesville. The role of the Gainesville Urban Area in this urban shift is portrayed in Table 6, where data comparing the total county population growth with concurrent growth in the Gainesville Urban Area is provided. As can be seen, the Gainesville Urban Area accounted for approximately 96% of the total county growth during the 1960-1970 decade, which, while certainly a high proportion, is actually lower than the figure for the 1950-60 decade. The proportion of the population living in the Gainesville Urban Area has steadily increased since 1950 to the present level of approximately 80%.

Table 6

Comparison of Gainesville Urban Area (GUA) and Alachua County Population 1950-1970

	1950	1960	1970
Alachua County Population	57,026	74,074	104,764
Ten Year Increase	18,419	17,048	30,690
Percent Increase	47.7	29.9	41.4
GUA Population	36,360	53,111	82,411
Increase	15,729	16,751	29,300
Percent Increase	76.2	46.1	55.2
GUA increase as a Percent of County Increase	85.4	98.2	95.5
GUA Population as a Percent of County Population	63.8	71.7	78.7

Source: Gainesville Department of Community Development, Population Study, 1968.
Census Publications, 1950, 1960, 1970.

This is not to say that the Gainesville Urban Area is the only area to experience population increases; rather, the GUA accounts for more of the total county increase than all of the remainder of the county summed together. A look at Table 7 suggests that several of the smaller municipalities experienced significant growth. La Crosse underwent a phenomenal growth rate of 121%.

Table 7

Population Change

Selected Incorporated Areas of Alachua County

1950-1970

Incorporated Areas	1950	1960	Percent Change 1950-60	1970	Percent Change 1960-70
Alachua	1,116	1,974	76.8%	2,252	14.1%
High Springs	2,088	2,329	11.5	2,787	19.7
La Crosse	146	165	13.0	365	121.2
Waldo	647	735	13.6	800	8.8
Newberry	873	1,105	31.7	1,247	12.9
Archer	586	707	20.7	898	27.0
Micanopy	612	658	7.5	759	15.4
Hawthorne	1,058	1,167	10.3	1,126	-3.5

STUDENT ENROLLMENT

The shift to Gainesville may be partially explained by the increase in enrollment at the University of Florida. As noted earlier, in-migration has accounted for greater than half of the population increase in the county since 1960. Furthermore, almost 96% of the county's population increase is centered in the Gainesville Urban Area. It might be suggested that student enrollment would be a contributing factor, particularly in recent years, during which time much emphasis was being placed on higher educational attainment and advanced degrees.

In fact, enrollment at the University of Florida has been shown to be a significant factor in population increase, accounting for approximately 55% of net migration into the county for both the 1950-60 and the 1960-70 decades. Revised

enrollment estimates project student population at the University of Florida to increase from a current 23,500 to approximately 27,000 by 1982, an increase of 15%. (Unofficial enrollment projections were provided by the Planning and Analysis Division, University of Florida; May 17, 1973.) This increase will be reflected heavier in the graduate school than at the undergraduate levels, as graduate enrollment is expected to increase almost 40%, while freshman and sophmore enrollment is projected to rise by only 8%. Undergraduates will still constitute the major portion of the student population (74% by 1982), although graduate student enrollment will substantially rise (to represent 26% by 1982). The potential effect of students upon the housing market becomes apparent when it is considered that the University of Florida attempts to provide housing for approximately 50% to 55% of the total enrollment in dormitories (mostly freshmen and sophomores, fraternities and sororities and married housing.) Therefore, the type of housing sought by students in the housing markets may vary somewhat with the changing nature of the student body, although to speculate exactly what the effect will be is purely conjecture. Furthermore, associated with an increase in student enrollment is of course an increase in the number of faculty and staff, as well as service and support personnel.

INCOME

Any socio-economic analysis oriented towards establishing a data base for a housing study must include data regarding family income and the distributions of income levels. Ideally, a micro-analysis of an area by census divisions (enumeration districts or census tracts) would be performed, establishing correlations between the type and quality of housing and a number of socio-economic variables. For this report, an

Table 8

Income in 1969 of Families and Unrelated Individuals

Alachua County, City of Gainesville and Balance of County

	Total	%	Gainesville	%	Balance	%
All Families	23,871		13,689		10,182	
Less than $1,000	782	3.3	422	3.1	360	3.5
$1,000-$1,999	1,138	4.8	572	4.2	566	5.6
$2,000-$2,999	1,252	5.2	697	5.1	555	5.5
$3,000-$3,999	1,587	6.7	878	6.4	709	7.0
$4,000-$4,999	1,736	7.3	987	7.2	749	7.4
$5,000-$5,999	1,684	7.1	922	6.7	762	7.5
$6,000-$6,999	1,538	6.4	835	6.1	703	6.9
$7,000-$7,999	1,690	7.1	954	7.0	736	7.2
$8,000-$8,999	1,607	6.7	882	6.4	725	7.1
$9,000-$9,999	1,486	6.2	787	5.8	699	6.9
$10,000-$11,999	2,436	10.2	1,426	10.4	1,010	9.9
$12,000-$14,999	2,734	11.5	1,622	11.9	1,112	10.9
$15,000-$24,999	3,112	13.0	1,954	14.3	1,158	11.4
$25,000-$49,999	934	3.9	655	4.9	269	2.6
$50,000 or more	155	.7[1]	86	.6[1]	69	.7[1]
Median Income	$ 8,329		$ 8,655		$7,933	
Mean Income	$10,155		$10,443		$9,768	
≤$ 3,000	3,172	13.3 (31.4)[2]	1,691	12.4	1,481	14.6
>$10,000	9,371	39.3 (11.2)[2]	5,753	42.0	3,618	35.5

[1]Figures are rounded, therefore columns may not total 100.0%

[2]Corresponding 1959 figures.

Source: Census Publications PHC (1)-77, p. 10.

area-wide view of family income data, the median value of owner-occupied houses, and the median gross rent paid by renters will be obtained by referring to the 1970 Census. The income data will provide an idea of what a family can afford to pay, either to buy or rent, using Federally-established guidelines, while the median value and median rent data will show what people are actually paying. Using as a guideline the HUD proposal that no family should have to devote more than 25% of its income to housing, one other variable provided by the Census Bureau will be considered--the percentage of family income going to rent, stratified by income livels. This procedure will identify the "housing poor," that is, those who must pay more than one-fourth of their income to rent, thereby leaving little disposable income for other necessities, such as food and clothing.

The 1969 distribution of income levels for Alachua County, Gainesville, and the balance of the county is given in Table 8. Trend data would, in this case, be inaccurate and misleading unless all dollar figures were standardized to measure against a common value. One measure that may give some comparability is to identify the number of families in 1959 and 1969, that were making less than or equal to $3,000, and equal to or greater than $10,000. These two figures are generally accepted as indicators of poor and affluent families. In 1969, the Census Bureau defined "the poverty threshold for a non-farm family of four" as $3,743. (Census, PHC (1)-77, App. 8-9.) Although close to 40% of the county's families are making $10,000 or more, there is, nevertheless, a sizable proportion of the population which is making $3,000 or less. If we include all families whose incomes are below poverty level, the percentages increase.

Table 9

Income Below Poverty Level

Alachua County, City of Gainesville and Balance of County

	Total	%	Gainesville	%	Balance	%
Families	3,660	15.3	1,917	14.0	1,743	17.1
Mean Family Income	$1,982		$1,942		$2,025	

Source: Census, PHC (1)-77 p. 10.

PERCENT OF INCOME GOING TO RENT

One further economic variable pertinent to housing is the percent of income going to rent. Using 1970 Census data, it is possible to determine what percent of income is going to rent, and how many households are devoting greater than 25% of their income to rent. In this situation, rent refers to gross rent, or the contract rent plus an estimate of monthly utilities. Referring to the definitions at the beginning of the report, it should be noted that gross rent, as a percentage of income, is computed on the basis of total yearly income of the family or primary individual. It should be further noted that percentages were computed separately for each unit and rounded to the nearest whole number. The "not computed" category pertains to those units for which no cash is paid, or in which cases the occupants claimed no income or a net loss.

The table points out that nearly half of all households occupying renter units in the county are paying 25% or more of their income for rent. It is interesting to note that the median percent of income going to rent is higher for Gainesville than for the county as a whole, or the balance of the county, in all income categories shown, excepting the lower income group in which all

Table 10

Gross Rent as a Percentage of Income, By Income

1970

Alachua County

	Total	%	Gainesville	%	Balance	%
Specified Renter Units	11,776		9,465		2,311	
Income less than $15,000	6,502		5,283		1,219	
Less than 20%	570	8.8	421	8.0	149	12.2
20-24	427	6.6	339	6.4	88	7.2
25-34	844	13.0	704	13.3	140	11.5
35	4,019	61.8	3,460	65.5	559	45.9
Not Computed	642	9.9	359	6.8	283	23.2
Median		35.0+		35.0+		35.0+
$5,000-$9,999	3,508		2,757		751	
Less than 20%	1,710	48.8	1,261	47.7	449	59.8
20-24	810	23.1	696	25.2	114	15.2
25-34	645	18.4	565	20.5	80	10.7
35	182	5.2	164	6.0	18	2.4
Not Computed	161	4.6	71	2.6	90	12.0
Median		19.8		20.6		17.1
$10,000-$14,999	1,255		984		271	
25% or More	41		41		-	
Not Computed	44		-		44	
Median		15.1		15.9		12.5
$15,000 or More	511		441		70	
25% or More	-		-		-	
Not Computed	5		5		-	
Median		11.7		12.0		10.0

Total, All Income Ranges, Rent 25% of Income

Total	%	Gainesville	%	Balance	%
5,731	48.7	4,934	52.1	797	34.5

Source: Census, PHC (1)-77, H-4.

areas listed show an unspecified median greater than 35%. The figures also show that greater than half of the Gainesville households in renter occupied units are paying more than 25% of their income in rent.

OVERCROWDING

There remain two socio-economic variables to consider in relation to housing: persons per room; and persons per household. As a measuring of housing adequacy, it is generally accepted practice to consider the ratio of persons to the number of rooms, with a ratio of one person per room being the national standard for overcrowding. (U.S. House Document No. 92-319, p. 37.) The Census Bureau provides a measure of persons per room, derived by dividing the number of persons in each unit (which may include occupants that are not related to the head of the household, such as roomers, boarders, wards, resident employees and others) by the number of rooms in that housing unit. "Rooms" here refers to whole rooms used for living purposes, and does not include bathrooms, storage rooms, halls, basements, unfinished attics, or the like. The figures listed in Table 11, therefore, represent the number of housing units with the specified ratio of persons per room.

Judging from the table, overcrowding, here defined as being more than 1.00 persons per room, exists for between 6.9% and 9.6% of the population on the average, depending upon the geographic location within the county. The higher proportion of defined overcrowding existing outside of Gainesville may in part be a function of the number of persons per household in this predominately rural area.

Table 11

Persons Per Room

Alachua County-1970

	Total	%	Gainesville	%	Balance	%
All Occupied Housing Units	31,115		18,777		12,338	
1.00 or Less Persons per Room	28,511	91.6	17,492	93.2	11,019	89.3
1.01 to 1.50	1,813	5.8	916	4.9	897	7.3
1.51 or More	791	2.5	369	2.0	422	2.3

Note: Percentages represent rounded computations, therefore, columns may not add up to exactly 100.0%.

Source: Census PHC (1)-77, H-1.

Referring again to the definitions at the beginning of the study, one should note that a household does not necessarily constitute a number of related individuals. Indeed, since by definition "the count of occupied housing units is the same as the count of households," one or more unrelated individuals (such as students) occupying one housing unit would classify as one household. Thus, saying that the average household size is, 3.6, for example, should not be construed to mean that the average family size is 3.6; rather, the average occupancy rate for housing units in the defined area is 3.6 persons. No conclusions should be drawn regarding housing types without first considering the nature of the area to which the figures apply (student-non student, farm-non farm, urban-rural), and stating assumptions accordingly. With this in mind, consider the data in Table 12, which depicts the sizes of households in several municipalities within the county and compares them to county-wide and state figures.

Table 12

Persons Per Household

Florida, Alachua County and Selected Municipalities

	1950	1960	1970
Florida	3.25	3.11	2.90
Alachua County	3.41	3.40	3.06
Gainesville			2.94
Alachua	*	3.75	3.60
Hawthorne	*	3.58	3.30
High Springs	*	3.22	3.20
Newberry	*	3.23	3.21

* Data not available for these municipalities for 1950.

Source: 1960 and 1970 Census of Housing

There appears to be a trend in the state and within Alachua County towards smaller households, although this phenomena is least noticeable in High Springs and Newberry. The decline in the size of households is expected to continue in Alachua County, such that by 1985 household size is forecasted to be approximately 2.79 persons. (N.C.F.R.P.C., Population and Economic Study, p. 146.) Projections of household size for the Gainesville Urban Area and the smaller municipalities within the county will be considered later in this report.

Housing Profiles

Thus far, a few socio-economic variables pertinent to identifying housing needs have been briefly reviewed. The second task is to construct a housing profile of the county and of each municipality therein, and to follow up with an examination of trends in housing construction. The profiles will identify three major characteristics of housing for each study area, and will provide trend data when available.
The three major types are:

1) housing type- single-family, multi-family, mobile home
2) housing tenure- owner-occupied, renter-occupied, vacant
3) housing conditions- sound, deteriorating, dilapidated (refer to definitions at the beginning of the study).

The profiles will also supply some supplemental data, such as the median value of owner-occupied housing, the median contract rent for renter-occupied housing, and persons per unit. In addition, some data concerning housing owned, rented, or occupied by Blacks will be supplied. These profiles will be specific only to the study areas, and not to any sub-areas therein.

Looking first at the county as a whole, the first item to note is that total housing production from 1960 to 1970 increased the housing supply 53% from 22,000 to 33,500 housing units. Approximately 46% of this production was single-family construction (5,286 units), and 42% was multi-family construction (4,882). The remaining 12% is accounted for by mobile homes, increasing from 672 to 2,046 units, an increase of 204% since 1960.

Table 13

Alachua County - Housing Profile

1950, 1960, 1970

	Total	%	Total	%	% Change 1950 -1960	Total	%	% Change 1960 -1970
Total Population	57,026		74,074			104,764		
Total Housing Units	15,988		21,933		37.12%	33,538		52.1%
Total Occupied	14,811	92.6	19,888	90.7	34.3	31,115	92.8	56.5
Owner Occupied	7,827	52.9	12,312	61.9	57.3	18,911	60.8	53.6
Renter Occupied	6,984	47.2	7,576	38.1	8.5	12,204	39.2	61.1
Vacant	1,177	7.4	2,045	9.3	73.7	2,432	7.2	18.9
Median Value $			10,600			14,000		32.1
Median Contract Rent $			44			89		102.3
Single Family	12,251	76.6	17,987	82.0	46.8	23,273	69.39	29.4
Multi-Family	3,379	21.1	3,319	15.1	- 1.8	8,201	24.45	147.1
Mobile Home	358	2.2	672	3.06	87.7	2,046	6.10	204.5
Persons/Room	3.4		3.4			3.1		
# Households	14,841		19,516		31.5	31,115		59.4
20 yrs. old			7,979	36.4		9,653	28.8	21.0
1.01 PPR			2,796	14.1		2,447	7.9	-12.5
Deteriorating[1]			3,847			2,534		
Dilapidated[1]			1,887			612		

Note: All data is census data unless specifically noted otherwise.

[1] Housing in Florida, prepared by the Office of the Governor, The Governor's Task Force on Housing and Community Development, and the State of Florida Department of Community Affairs, Vol. 1, Table IV, "Substandard Housing Totals by County and Region," pg. 12.

When expressed as a percent of total occupied housing, single-family housing declined almost 13 percentage points, as both multi-family units and mobile home units experienced a rise in popularity. Multi-family units show the greatest increase as a proportion of total units, accounting for 24% of all units in 1970, up nine percentage points from 15% in 1960. Although mobile homes increased in absolute numbers by 204%, the proportion of total units being mobile homes rose three percentage points from 3% to 6%.

The relative decline in single-family structures and the concomitant rise in multi-family units is perhaps best explained by the increase in student enrollment at the University of Florida and the housing needs and demands associated with students. Table 14 illustrates the trends in population and household development in Alachua County since 1960, dividing the county into Gainesville and the remainder of the county, and into student and non-student categories. It should be noted that Gainesville was the center of population and household growth for the county from 1960 to 1970, and continues to play that role. It should be further noted that the vast majority of the student population resides in Gainesville, therefore, student household formation has a direct impact on the housing market in Gainesville.

Student demand for housing has been and remains largely associated with multi-unit apartment complexes, allowing for the propensity of students to room together and thereby save on rent. Accordingly, the absorption of new multi-family units is dependent upon the sizes of the student population. From 1960 to 1965, student enrollment increased at an average annual rate of 750 additional students, and this figure jumped to an annual expansion of 1,074 students between 1960 and 1970. During the period from 1960 to 1965, multi-family construction

Table 14

Trend of Population and Household Growth
Gainesville, Florida, Housing Market Area (HMA)
April 1960-April 1971

Area and type	April 1960	April 1970	April 1971	Average annual change 1960-1970 Number a/	Average annual change 1970-1971 Number a/
Population					
HMA Total	74,074	104,764	108,000	3,070	3,080
Gainesville	29,701	64,510	65,325	3,480	3,235
Remainder of HMA	44,373	40,254	42,675	- 410	- 155
HMATotal	74,074	104,764	108,000	3,070	3,080
Student b/	13,100	19,770	21,200	670	730
Nonstudent	60,974	84,994	86,800	2,400	2,350
Households					
HMA Total	19,888	31,114	32,125	1,120	1,110
Gainesville	7,749	18,776	19,025	1,100	1,025
Remainder of HMA	12,139	12,338	13,100	20	85
HMA Total	19,888	31,114	32,125	1,120	1,110
Student c/	3,100	5,150	5,700	200	235
Nonstudent	16,788	25,964	26,425	920	875

a/ Rounded.
b/ Includes only students, not their dependents.
c/ Student households were estimated by adding married student households and students living together in rental units.

Sources: 1960 and 1970 Censuses of Population and Housing; 1971 and 1973 estimated by Housing Market Analyst.

Table from 1971 Gainesville Housing Market Analysis, Dept. of Housing and Urban Development.

amounted to an annual average of 330 units; this figure increased to 570 units per year (average) for the 1965-1970 time span. During the same time period, the University provided an additional 1,014 dwelling units in university-owned dormitories.

Building permit data for the county and for the Gainesville Urban Area indicate that since 1970, multi-family construction has surpassed construction of single-family units, and this construction has been centered in the Gainesville area. Approximately 2,000 single-family units were authorized by building permits from 1971 through March of 1973, while multi-family unit authorization totaled approximately 4,600 units for the same time period (for the entire county). The placement of mobile home units by permit totaled 1,400.

VACANCY RATE

The vacancy rate for all housing in the county rose from 1950 to 1960, but then declined again in 1970 to below the 1950 mark. A more thorough breakdown of vacancy rates indicates that since 1960 the home-owner vacancy rate has steadily declined to a low in 1971 of approximately 1.9% (estimated), from a high in 1960 of 2.8%. In contrast to this, renter vacancy rates have fluctuated considerably, rising from 7.9% in 1960, to 9.3% in 1970, and back down again to 6.4% (estimated) through April, 1971.

Figures from quarterly surveys performed by the Off-Campus Housing Division at the University of Florida show that renter units are indeed highly dependent upon students as clientele. The data illustrates that the summer months consistently have higher vacancy rates that at any other time of the year, and it is during the summer that student enrollment is down to approximately one-half what it is during the remainder of the year.

Table 15

Vacancy Rates in Apartments

Gainesville Urban Area

1970-1973

Date	Number of Projects	Units	Vacancies	Vacancy Rate %
2/70	33	2,744	95	3.4
5/6/70	33	2,744	103	3.8
7/7/70	33	2,744	398	14.5
11/4/70	38	3,190	8	.3
2/9/71	38	3,190	4	.1
4/27/71	38	3,190	26	.8
7/16/71	36	2,794	194	6.9
11/21/71	38	3,295	13	.3
2/15/72	35	2,963	18	.6
4/24-25/72	35	2,964	39	1.3
7/72	35	2,964	476	16.0
10/72[1]	48	4,462	509	11.4
2/73	46	4,074	269	6.6
4/73[2]	43	3,898	246	6.31

[1] In October, 1972, the survey was broken down into prior units and new units. The prior unit vacancy rate was 7.48, new unit rate, 26.89.

[2] New unit vacancy rate was 13.47.

Note: New units are only those units completed and marketable before September (beginning of academic year). Therefore, the 1973 figures do not include at least ten apartment complexes.

OWNER-OCCUPIED HOUSING

Owner-occupied housing, expressed as a percent of all occupied housing units, has remained consistent at approximately 61% since 1960. Looking at a breakdown of owner-occupied houses by income groups, it is worthwhile to consider the economic aspects of building a house in the area, and to display some data regarding sales prices of houses currently on the market. This should give an indication of what the market will support, and what home-builders and buyers must pay.

Information gained from the Home Builders Association of Gainesville suggests that the cost of materials for a typical residential unit has experienced an average annual cost increase of 3.8% since 1963. Within Alachua County, the cost of materials has risen 3% since April, 1973. The total cost of materials is not the only component that has become more expensive. Indeed, practically every aspect of home building and buying has experienced a cost increase. Interest rates have increased from approximately 5-3/4% to 6% in 1969, to 7.5% to 8% today. Labor costs have also increased, and the cost of land has jumped considerably. For instance, a 100 foot by 100 foot lot, costing approximately $2,000 in 1963, now costs between $6,000 and $8,000, resulting in an increase between 200% and 300%.

A typical three-bedroom residential housing unit, with 1,200 square feet of living space on a 100 foot by 100 foot lot will cost today between $24,500 and $25,000. This figure includes a basic cost price of approximately $21,100, plus builder's profit and real estate commission. This cost will, of course, vary depending on what amenities or luxuries are put into the house or grounds. Consequently, cost per square foot will also vary depending upon what goes into or what does not go into a specific house.

Table 16

Value of Owner Occupied Housing

Alachua County

1970

VALUE	ALACHUA County	GAINESVILLE	BALANCE
Specified owner occupied units	15,089	8,651	6,438
less than $5,000	1,736	368	1,368
$5,000 to $7,499	1,516	589	927
$7,500 to $9,999	1,343	679	664
$10,000 to $14,999	3,596	2,328	1,268
$15,000 to $19,999	2,670	1,974	723
$20,000 to $24,999	1,479	1,013	466
$25,000 to $34,999	1,636	1,037	599
$35,000 to $49,999	808	490	318
$50,000 or more	305	200	105
Median	$14,100	$15,800	$10,900

Table 17

Distribution of Houses, by Price, on Housing Market

Gainesville

April, 1973

$25,000 . . .	12
$25,000-$35,000 . . .	13
$35,000-$50,000 . . .	26
$50,000 . . .	4
	55

To give some indication of the cost of housing, consider and contrast the census figures relating to the value of owner-occupied housing and the data regarding the prices of houses on the market, but not sold in April, 1973. Table 16 gives Census data for 1970.

The census figures seem to indicate that the mid-point in the distribution of housing values for the county as a whole was $14,000 in 1970, and almost $16,000 in the City of Gainesville for the same year. Contrast this with Table 17 which indicates the number of houses by price range that were on the housing market, but not yet sold as of April, 1973.

From this, it would appear that only 12, or 21.8%, of these new houses were potentially close to the 1970 median value of houses in Gainesville, much less in the county. It is significant to point out that the majority of these houses fall into the $35,000 to $50,000 price range. If the majority of new houses cost between $35,000 and $50,000, then following the rule of thumb that the purchase price of a new house should be no greater than twice the family income, it becomes apparent that the average family in the county or in Gainesville cannot afford a <u>new</u> home. Breaking down 1970 census figures for family incomes into percents, approximately 17.5% of total county families and 19.8% of Gainesville families have incomes greater than $15,000, and therefore, could possibly afford a house in the given price range.

If indeed the figures on houses built, but not yet sold, is representative of the distribution of prices of houses being built, and if approximately 21.2% are priced below $25,000 with the typical residential unit costing $24,000 to $25,000, then 61% of the county's population, and 58% of Gainesville's population, with family incomes less than $10,000, cannot afford a

new home. While the emphasis here is on buying a new home, it is noteworthy to suggest that the filtration process alone cannot be counted on to provide housing for those families with insufficient income to purchase a new home.

RENTER OCCUPIED HOUSING

The portion of occupied housing units that is renter-occupied has declined from a high in 1950 of 47% to a 1970 figure of 39% (refer to Table 13). The rise in percentage points from 1960 to 1970 may in part be attributable to the rising costs of new home construction, particularly since 1969, and the tight money situation. In Alachua County, however, Gainesville is the center of the population and household growth, and the increase in renter-occupied units may also be partially explained by the increase in student enrollment at the University of Florida. Approximately 4,600 rental units (multi-family units) have been authorized by building permits since 1971, nearly all of which have been constructed. (Contrast this with the approximately 2,000 single-family homes that were authorized in the same period, with approximately 90% of those authorized completed or under construction.) Of these 4,600 new apartment units, it can be assumed that a significant proportion will be occupied by student households. Referring again to the survey of apartment managers conducted by the University of Florida Division of Housing, it is interesting to note the replies to the question: "How many units are occupied by married students and single-student groups?" The trend of the results are:

	24-26% --	occupied by student families
	49-51% --	occupied by single-student groups (averaging 2.9 to 3.0 students per unit)
Balance	23-27% --	non-university personnel

Table 18

Contract Rent for Renter Occupied Units

Alachua County

1970

CONTRACT RENT	Total	Gainesville	Balance
Specified renter occupied units	11,784	9,451	2,333
Less than $30	568	285	283
$30 to $39	757	613	144
$40 to $59	1,765	1,406	359
$60 to $79	1,962	1,583	379
$80 to $99	1,197	1,000	197
$100 to $149	2,958	2,533	425
$150 to $199	1,502	1,414	88
$200 to $249	320	283	37
$250 or more	114	107	7
No cash rent	641	227	414
Median	$89	$95	$68

Source: Census PHC (1)-77, H-1.

The implication here is that occupancy of apartment units has been specifically due to students or other university-related personnel, since those managers responding to the survey suggested that between 73% and 77% of their occupants were university-related. This trend may continue, even with the large increase in the number of apartments now available as both the University of Florida and Santa Fe Community College increase their enrollments, and as the University of Florida Medical Center expands to include a school of dentistry and further research facilities.

Although the cost of new housing construction has risen, and perhaps discouraged some people from considering a new home, rent levels have also increased. Table 18 indicates the contract rent for renter-occupied units in the county.

For the newer apartment complexes that have been and are still being constructed, rent levels run somewhat as follows:

1 Bedroom	\$140 - \$180/mo.	(unfurnished-kitchen equipped)
2 Bedroom	\$190 - \$250/mo.	" "
3 Bedroom	\$221 - \$330/mo.	" "
4 Bedroom	\$280 - \$360/mo.	" "
5 Bedroom flat	\$375/mo.	" "

MOBILE HOMES

Mobile home units have increased considerably since 1960, and this may be partially explained by better unit construction, a dislike for, or an inability to afford either a new home or an apartment, and perhaps the attractiveness of this style housing to students, the elderly and young families. Mobile homes account for 6% of all housing units within the county, with the greatest concentration in or around Gainesville and Micanopy. This form

Table 19

Housing Profile

Gainesville Urban Area

1950, 1960, 1970

	1950		1960		% Change	1970		% Change
	Total	%	Total	%	1950-1960	Total	%	1960-1970
Population	53,111		72,000			82,411		
Total Housing Units	15,056		20,960		39.2	26,810		27.9
Total Occupied	13,865	92.1	19,490	92.9	40.6	25,041	93.4	28.5
Owner Occupied	8,131	58.7	11,025	56.0	35.6	14,719	54.9	33.5
Renter Occupied	5,734	41.4	8,565	44.0	49.4	12,091	45.1	41.2
Vacant	1,191	7.9	1,470	7.0	23.4	1,780	6.64	21.1
Single Family			14,894	68.2		16,461	61.4	10.5
Multi-Family			6,085	27.9		8,123	30.3	33.5
Mobile Homes			861	3.0		2,225	8.3	158.8
Persons Per Household	3.26		3.20			2.94		
Public Housing						585		

Table 20

Housing Profile

Alachua, 1960, 1970

	1960		1970		
	Total	%	Total	%	% Change
Total Housing Units	577		690		19.6
Total Occupied	519	90.0	625	90.6	20.4
Owner Occupied	306	53.0	432	62.6	41.2
Renter Occupied	213	36.9	193	27.9	-9.4
Vacant	58	10.1	65	9.4	12.1
Average Value	$6,500		9,486		45.9
Single Family			653	94.6	
Multi Family			30	4.4	
Mobile Homes			7	1.0	
Persons Per Household	3.8		3.6		
Sound	358	62.0	270	40.5	-24.6
Deteriorating	192	33.3	122	18.3	-36.5
Dilapidated	27	4.7	274	41.2	914.8
Black Owner Occupied			233	33.8	
Black Renter Occupied			103	14.9	
Total Black Occupied			336	53.8	
Public Housing			80		

Source: Housing Conditions Study
1970 Census Access Printout
1960 Census of Housing

Table 21

Housing Profile

Archer, 1970

	1970	
	Total	%
Total Housing Units	292	
Total Occupied	262	89.7
Owner Occupied	209	71.6
Renter Occupied	66	22.6
Vacant	16	5.5
Single Family	261	89.4
Multi-Family	10	3.4
Mobile Home	21	7.2
Sound	195	57.1
Deteriorating	71	20.8
Dilapidated	75	22.1
Persons Per Household	3.25	
Black Owner Occupied	61	20.9
Black Renter Occupied	27	9.2
Total Black Occupied	88	31.9
Public Housing	30	

Source: Housing Conditions Study
1970 Census Access Printout

Table 22

Housing Profile

Hawthorne, 1960, 1970

	1960		1970		% Change
	Total	%	Total	%	1960-1970
Total Housing Units	385		382		
Total Occupied	332	83.6	338	88.5	5.0
Owner Occupied	196	50.9	238	62.3	21.4
Renter Occupied	126	32.7	98	25.7	-22.2
Vacant	63	16.4	44	11.5	-30.2
Average Value $			9,270		
Single Family			350	91.6	
Multi-Family			23	6.0	
Mobile Home			8	2.1	
Persons Per Household	3.6		3.30		
Sound	235	61.0	181	40.8	-23.0
Deteriorating	95	24.7	98	22	3.2
Dilapidated	55	14.3	165	37.2	200.0
Black Owner Occupied			106	27.7	
Black Renter Occupied			56	14.7	
Total Black Occupied			162	47.9	
Public Housing			40		

Source: Housing Conditions Study
1970 Census Access Printout
1960 Census of Housing

Table 23
Housing Profile
High Springs, 1960, 1970

	1960		1970		% Change
	Total	%	Total	%	1960-1970
Total Housing Units	785		938		19.5
Total Occupied	724	92.2	871	92.9	20.3
Owner Occupied	507	64.6	658	70.2	29.8
Renter Occupied	217	27.6	211	22.5	2.8
Vacant	61	7.8	67	7.1	9.8
Average Value	$6,000		8,800		46.7
Single Family			865	92.2	
Multi-Family			55	5.9	
Mobile Home			18	1.9	
Persons Per Household	3.2		3.2		
Sound	649	82.7	439	49.4	-32.4
Deteriorating	110	14.0	164	18.4	49.1
Dilapidated	26	3.3	287	32.2	1003.9
Black Owner Occupied			198	21.1	
Black Renter Occupied			73	7.8	
Total Black Occupied			271	31.1	

Source: Housing Conditions Study
1970 Census Access Printout
1960 Census of Housing

Table 24

Housing Profile

Micanopy, 1970

	1970	
	Total	%
Total Housing Units	262	
Total Occupied	245	93.5
Owner Occupied	186	71.0
Renter Occupied	59	22.5
Vacant	17	6.5
Single Family	214	81.7
Multi-Family	11	4.2
Mobile Home	37	14.1
Sound	109	36.9
Deteriorating	117	39.5
Dilapidated	70	23.6
Persons Per Household	3.10	
Black Owner Occupied	81	30.9
Black Renter Occupied	16	6.1
Total Black Occupied	97	39.6

Source: <u>Housing Conditions Study</u>
1970 Census Access Printout

Table 25

Housing Profile

Newberry, 1960, 1970

	1960		1970		% Change
	Total	%	Total	%	1960-1970
Total Housing Units	372		426		14.5
Total Occupied	342	91.9	389	91.3	13.7
Owner Occupied	250	67.2	297	69.7	18.8
Renter Occupied	92	24.7	92	21.6	9.9
Vacant	30	8.1	37	8.7	23.3
Average Value $	4,500		6,810		
Single Family			365	85.7	
Multi-Family			24	5.6	
Mobile Home			37	8.7	
Persons Per Household	3.2		3.21		
Sound	257	69.1	216	49.4	16.0
Deteriorating	89	23.9	93	21.3	- 2.6
Dilapidated	26	7.0	128	29.3	469.2
Black Owner Occupied			86	20.2	
Black Renter Occupied			45	10.6	
Total Black Occupied			131	33.7	
Public Housing			30		

Source: <u>Housing Conditions Study</u>
1970 Census Access Printout
1960 Census of Housing

Table 26

Housing Profile

Waldo, 1970

	1970	
	Total	%
Total Housing Units	303	
Total Occupied	278	91.7
Owner Occupied	226	74.6
Renter Occupied	49	16.2
Vacant	25	8.3
Single Family	262	86.5
Multi-Family	12	4.0
Mobile Home	27	8.9
Sound	122	39.2
Deteriorating	97	31.2
Dilapidated	92	29.6
Persons Per Household	2.87	
Black Owner Occupied	43	14.2
Black Renter Occupied	16	5.3
Total Black Occupied	59	21.2
Public Housing	20	

Source: Housing Conditions Study
1970 Census Access Printout

of shelter affords the occupant the security and (potentially) the convenience of a house or an apartment without the cost of either. Mobile homes have increased numerically by the greatest percentage of any other housing unit type in the last twenty years.

Housing Projections

HOUSING NEEDS

Methodology

In order to forecast housing needs, one must forecast the number of households, which by definition is equivalent to the number of occupied housing units. For the purposes of this report, the study area will be divided into three sections: the Gainesville Urban Area; the smaller municipalities; and the balance, or the unincorporated areas of Alachua County.

For the Gainesville Urban Area and the smaller municipalities, the population projections from the Population and Economics Study (N.C.F.R.P.C., 1972) will be used. However, population projections for the unincorporated areas are made difficult by a lack of pertinent data; consequently, population levels and housing unit counts for this area will be held constant at the level determined in the Housing Conditions Study (N.C.F.R.P.C., 1972). Total housing needs for the county as a whole will then be determined by summing the totals of the three divisions.

Gainesville Urban Area

The procedure for arriving at figures for the Gainesville Urban Area and the smaller municipalities is as follows:

1) beginning with the population projections from the Population and Economics Study, subtract the number of people residing in group quarters (if any) who would not be included in a housing census;

2) divide this figure, representing the population in housing units, by the projected population per household (or, by definition, population per

Table 27

Housing Needs

Gainesville Urban Area

	1973	1975	1980	1985
Population	93,984	101,700	118,849	136,755
Total Housing Units	30,767	33,523	39,866	46,694
Occupied Housing Units	28,583	31,143	37,036	43,379
Owner Occupied	15,035	16,506	18,925	21,342
Renter Occupied	13,548	14,637	18,111	21,950
Vacant	2,184	2,380	2,830	3,315
Single Family	18,891	20,080	22,903	25,495
Multi-Family	9,322	10,513	13,236	16,343
Mobile Homes	2,554	2,920	3,727	4,669

occupied housing unit), resulting in the total number of occupied housing units; and

3) determine the vacancy rates for each area and apply this to the total number of occupied housing units to arrive at the total number of housing units.

Assumptions

1) The size of households in the Gainesville Urban Area will decrease steadily.

2) The vacancy rate of 7.1% will be held constant for the purposes of the study. Vacancy rate is derived by averaging rates of the recent past.

3) Figures represent gross housing needs for specific years shown.

With the given assumptions, the results are indicated in Table 27.

The Smaller Municipalities

Forecasting for the smaller municipalities is made difficult due to the lack of trend data and the size of the communities. Such small size limits the accuracy of projections; the best approach is to assume that conditions will remain relatively the same throughout the study time period.

Assumptions

1) In the smaller municipalities, persons per dwelling unit (PPDU) will be synonymous with persons per household (PPH). Therefore, population projections divided by persons per dwelling unit (or persons per household) will yield the number of occupied housing units.

2) Where trend data is available, projections will be made regarding household size; where no trend data exists, household size will be held constant at the latest reported figure.

Table 28

Housing Needs

Alachua

	1970	1973	1975	1980	1985
Population	2,252	2,932	3,385	3,550	4,100
Population Per Household	3.60	3.56	3.52	3.45	3.38
Total Housing Units	691	913	1,022	1,136	1,339
Occupied Housing Units	626	827	962	1,029	1,213
Owner Occupied	432	572	640	711	838
Renter Occupied	193	255	285	317	374
Vacant	65	86	96	107	126
Single Family	653	864	967	1,075	1,267
Multi-Family	30	39	44	49	58
Mobile Homes	7	9	10	11	13

Table 29

Housing Needs

Archer

	1970	1973	1975	1980	1985
Population	898	953	1,013	1,150	1,290
Population Per Household	3.25	3.25	3.25	3.25	3.25
Total Housing Units	292	310	330	375	420
Occupied Housing Units	276	293	312	354	397
Owner Occupied	209	222	236	269	301
Renter Occupied	66	70	75	85	95
Vacant	16	17	18	21	23
Single Family	261	277	295	335	375
Multi-Family	10	11	11	13	14
Mobile Homes	21	22	24	27	30

Table 30

Housing Needs

Hawthorne

	1970	1973	1975	1980	1985
Population	1,126	1,331	1,370	1,460	1,545
Population Per Household	3.30	3.22	3.16	3.02	2.88
Total Housing Units	385	467	490	546	606
Occupied Housing Units	341	413	434	483	536
Owner Occupied	138	291	305	340	378
Renter Occupied	98	120	126	140	156
Vacant	44	54	56	63	70
Single Family	350	428	449	500	555
Multi-Family	23	28	29	33	36
Mobile Homes	8	10	10	11	13

Table 31
Housing Needs
High Springs

	1970	1973	1975	1980	1985
Population	2,787	3,095	3,300	3,610	3,930
Population Per Household	3.20	3.19	3.19	3.18	3.17
Total Housing Units	938	1,044	1,133	1,222	1,334
Occupied Housing Units	871	970	1,053	1,135	1,240
Owner Occupied	658	732	794	857	935
Renter Occupied	211	235	255	275	300
Vacant	67	74	80	87	95
Single Family	865	963	1,045	1,127	1,230
Multi-Family	55	62	67	72	79
Mobile Homes	18	20	22	23	25

Table 32
Housing Needs
Micanopy

	1970	1973	1975	1980	1985
Population	759	806	822	900	990
Population Per Household	3.10	3.10	3.10	3.10	3.10
Total Housing Units	262	278	284	311	342
Occupied Housing Units	245	260	265	290	319
Owner Occupied	186	197	202	221	243
Renter Occupied	59	63	64	70	77
Vacant	17	18	18	20	22
Single Family	214	227	232	245	279
Multi-Family	11	12	12	13	14
Mobile Homes	37	39	40	44	48

Table 33
Housing Needs
Newberry

	1970	1973	1975	1980	1985
Population	1,247	1,447	1,580	1,780	2,000
Population Per Household	3.21	3.20	3.20	3.19	3.18
Total Housing Units	425	495	541	611	689
Occupied Housing Units	388	452	494	558	629
Owner Occupied	297	345	377	426	480
Renter Occupied	92	107	117	121	149
Vacant	37	43	47	53	60
Single Family	365	424	464	524	590.
Multi-Family	24	28	30	34	39
Mobile Homes	37	43	21	53	60

Table 34

Housing Needs

Waldo

	1970	1973	1975	1980	1985
Population	800	854	890	945	1,010
Population Per Household	2.87	2.87	2.87	2.87	2.87
Total Housing Units	304	324	338	359	384
Occupied Housing Units	279	298	310	329	352
Owner Occupied	136	242	252	268	286
Renter Occupied	49	52	55	58	62
Vacant	25	27	28	30	32
Single Family	262	280	292	311	332
Multi-Family	12	13	14	14	15
Mobile Homes	27	29	30	32	34

3) Vacancy rates in these municipalities varied in 1970 from 5.5% in Archer to 11.5% in Hawthorne. This vacancy rate will be held constant for the purpose of projections, and it is considered unrealistic to calculate any additional turnover rates.

4) Figures represent gross housing needs for the years shown. Gross housing needs assumes that those structures presently rated dilapidated will be cleared and that new structures will be built as replacements. A further assumption is that deteriorating structures will be renovated and will not become dilapidated.

5) Barring new industry or major shifts in the economy, the type and tenure of housing should show little significant change over the years.

   (Mobile homes may be an exception, although they will probably constitute single-family dwellings and be owner-occupied. If construction costs continue to rise and housing construction centers in the Ganiesville Urban Area, mobile homes may be increasingly used as housing by low-income rural families and individuals who cannot afford a new home. The long-range effects of mobile homes on the housing markets will to a large part be determined by local statutes which may enhance or restrict their use. Specific local statutes should, therefore, be periodically consulted to update and reassess the potential effects of mobile homes on local housing markets.

The Unincorporated Areas

The remainder of the county, the unincorporated areas excluding the Gainesville Urban Area, will be held constant throughout the study time period. Data for this area is as follows:

Table 35

Housing Type, Unincorporated Areas of Alachua County*

Total Housing Units	-	4,263
Single-Family	-	3,252
Multi-Family	-	10
Mobile Homes	-	1,001

* Does not include unincorporated area of Gainesville Urban Area.

Summing the totals for the three study divisions results in a total housing figure for Alachua County through 1985.

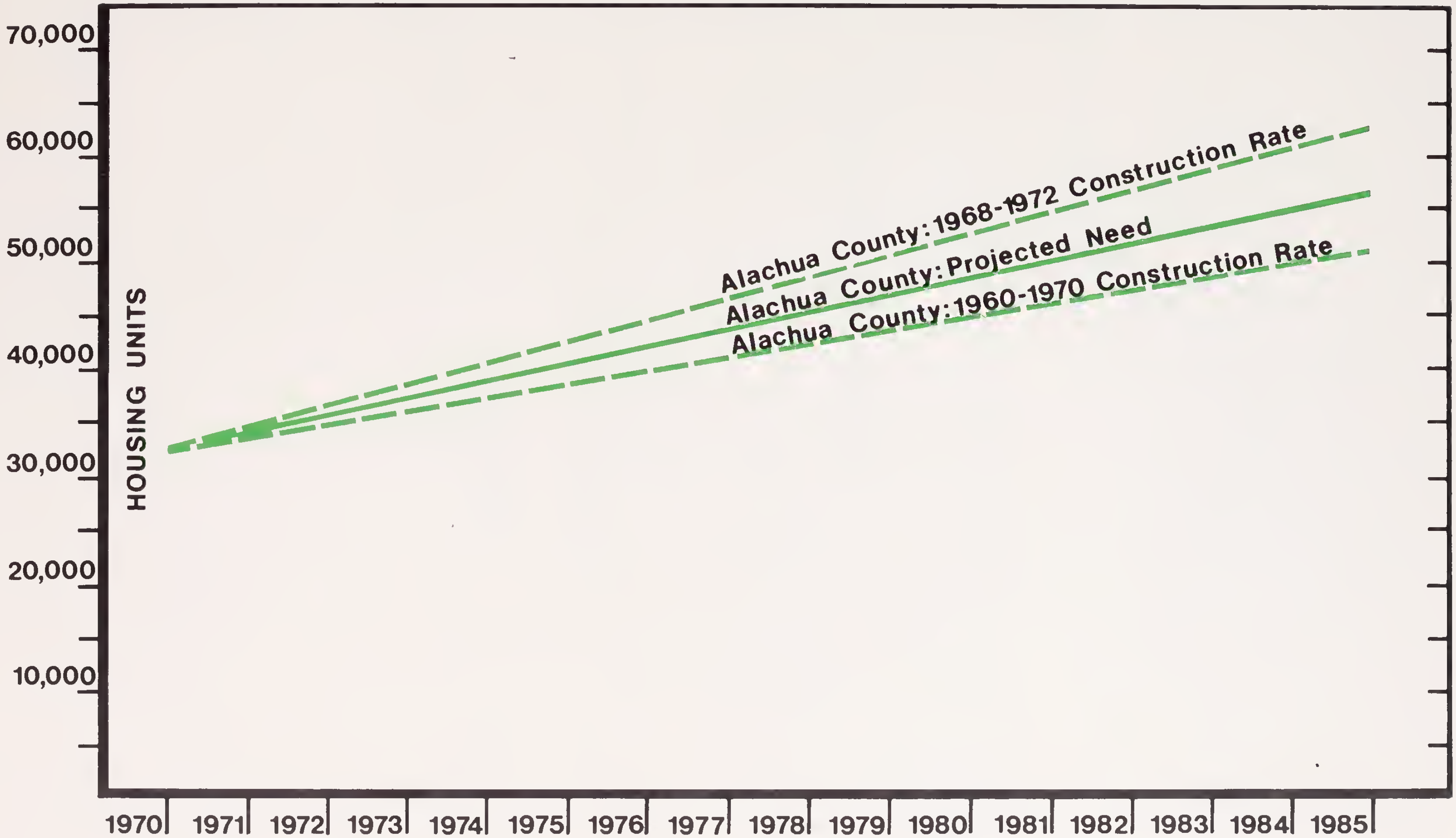
Table 36

Housing Units, Alachua County

1973, 1975, 1980, 1985

	1973	1975	1980	1985
Population	119,214	127,872	145,111	165,432
Total Housing	38,861	41,924	48,689	56,074
Total Occupied	35,819	38,583	44,810	51,607
Owner Occupied	22,010	23,695	27,523	31,667
Renter Occupied	13,874	14,880	17,278	19,923
Vacant	3,093	3,340	3,879	4,464
Single-Family	25,606	27,076	30,281	33,375
Multi-Family	9,525	10,730	13,505	16,608
Mobile Homes	3,727	4,078	4,929	5,893

Note: Figures are rounded, therefore, summing by category may not equal figure given representing totals.



Housing Needs and Housing Construction Rates

FIGURE 2

Figure 2 contrasts the projected housing needs for Alachua County with two construction rates for the county. The 1960-1970 construction rate is derived from 1960 and 1970 Census counts of housing units. The 1968-1972 construction rate is derived by tabulating figures of building permits issued during that time period. Both of these construction rates are projected forward in time to give an indication of the rate of housing construction needed to meet the county's anticipated demand.

Structural Conditions

Determining net new housing demand by area necessitates estimating how many units in the current housing stock warrant rehabilitation and how many warrant clearance. Using as a data base the Housing Conditions Study (N.C.F.R.P.C., 1972) it is possible to determine how many units are dilapidated, therefore rating clearance, and how many are deteriorating, warranting rehabilitation. This data is portrayed in Table 37.

Table 37
Units Rating Rehabilitation (Deteriorating) And Clearance (Dilapidated)

	Dilapidated	Deteriorating
Alachua County	4,167	3,637
Gainesville Urban Area	2,694	2,551
Alachua	274	122
Archer	75	71
Hawthorne	165	98
High Springs	287	164
Micanopy	70	117
Newberry	128	93
Waldo	92	97
Unincorporated Area	382	324

Net New Housing Needs

To arrive at net new housing needs, two operations are necessary:

1) subtract the dilapidated housing stock, as identified in the 1972 Housing Conditions Study, from the gross housing stock, resulting in the net sound housing stock; and

2) subtract net sound housing stock from the projected gross housing needs to determine the net new housing need.

This procedure will yield the results indicated in Table 38.

Consumer Capabilities

Anticipating housing demand in numerical terms is not a complete assessment of the housing needs picture. The ability and willingness of potential consumers to pay for various housing types is an important complement to determining numerical demand. How much consumers will be willing to pay cannot be projected; however, some idea of the capabilities of consumers can be gained by projecting the distribution of family incomes. Using the most recent census figures as a data base, computing an average annual increase in wages and salaries and projecting this trend into the future, it is possible to project family income, as shown in Tables 39 and 40. The reader should be cautioned that these figures represent total income before taxes, and therefore, should not be confused with disposable income. Table 39 depicts the percent distribution of families within each specified income group, while Table 40 shows income by deciles, dividing the distribution of families with income into ten groups of equal frequency.

Table 38

Net New Housing Needs

1973, 1975, 1980, 1985

	1973	1975	net change	1980	net change	1985	net change
Alachua County	9,490	12,553	3,063	19,318	6,765	26,703	7,385
Gainesville Urban Area	6,651	9,407	2,756	15,750	6,343	22,578	6,828
Alachua	496	605	109	719	114	922	203
Archer	93	113	20	158	45	203	45
Hawthorne	247	270	23	326	56	386	60
High Springs	403	492	89	581	89	693	112
Micanopy	86	92	6	119	27	150	31
Newberry	198	244	46	314	70	392	78
Waldo	112	126	14	147	21	172	25

NOTE: 1973 figure represents net change from 1970 to 1973.

Following the rule of thumb that the purchase price of a home should not exceed two to two and one-half times a family's income suggests that in 1975 one-half of the families will be able to afford a home in the $25,400 and over price range. By 1980, this figure rises to $27,000, and by 1985 to $29,688. However, this is not the complete picture; in 1975, it is projected that 40% of the families will have incomes less than or equal to $10,000, and will, therefore, be unable to purchase homes priced above the $20,000 to $25,000 range. By 1980, this percentage will decrease to 35% and, by 1985, 31.25%. This indicates that by 1985 approximately one-third of the families will generate a need for housing priced at or below $25,000.

A more detailed picture of the need for low cost housing is provided in Table 41. Assuming the cost of a house as only twice the family income, instead of two and one-half times, then by 1985 greater than one-third of the families (38.75%) will need housing costing at or below $25,000. Subdividing by housing value indicates that there will be a very substantial need for housing below the $16,000 price figure.

A more complete picture of the ability of the future consumer to pay for housing is shown in Table 42. Following the accepted standard that housing costs, whether on terms of monthly rent or mortgage payments, should account for no more than 25% of a family's income, it is significant to point out that by 1985 at least 11.25% of the families will need housing with monthly payments less than $105. It should be noted that the figures in the table represent the upper limit of the consumers ability to pay, as determined by the criteria mentioned above. This should not be construed to imply a willingness on the part of the consumer to pay these prices.

Table 39

Alachua County

Percent Distribution of Family Income

1969, 1973, 1975, 1980, 1985

	1969	1973	1975	1980	1985
<$4,000	17.34	12.00	11.25	9.75	
4,000-4,999	8.00	4.25	5.25	3.25	11.25
5,000-5,999	8.00	5.00	3.50	4.00	3.75
6,000-6,999	5.70	5.00	5.00	4.25	3.75
7,000-7,999	6.30	5.50	5.00	4.75	3.75
8,000-8,999	6.00	5.00	5.00	4.00	3.75
9,000-9,999	6.00	5.75	5.00	5.00	5.00
10,000-11,999	10.67	9.25	7.50	4.50	7.50
12,000-14,999	12.00	12.50	14.25	16.25	12.50
15,000-24,999	15.00	21.50	22.50	26.00	26.25
≥25,000	5.00	14.25	16.25	18.25	22.50
Median	8,730	11,638	12,712	13,508	14,844

Table 40

Alachua County

Estimated Family Income by Deciles[1]

1969, 1973, 1975, 1980, 1985

Decile	1969 Census	1969 Adjusted*	1973	1975	1980	1985
D - 1	$2,392	2,512	3,483	3,661	4,107	4,552
D - 2	4,078	4,282	5,751	6,021	6,696	7,371
D - 3	5,470	5,744	7,657	8,009	8,888	9,767
D - 4	6,863	7,206	9,606	10,047	11,150	12,252
D - 5	8,314	8,730	11,638	12,712	13,508	14,844
D - 6	9,902	10,397	13,999	14,657	16,310	17,964
D - 7	11,745	12,332	16,604	17,389	19,351	21,313
D - 8	14,235	14,947	20,274	21,253	23,700	26,147
D - 9	22,000	23,100	31,333	32,846	36,627	40,409
D - 9.5	23,823	25,014	33,929	35,567	39,662	43,757
Median	8,329	8,730	11,638	12,712	13,508	14,844

* Census figures must be adjusted by a factor of 1.05 to account for underreporting.

1 Deciles divide a distribution into ten groups of equal frequency. Another way of expressing this is in percentiles; D-1 represents zero to the tenth percentile, D-2 represents the eleventh to the twentieth percentile and so forth. These figures represent the incomes at the top of each decile level. Therefore, D-5 is the median family income.

Table 41

Consumer Housing Purchasing Power

Alachua County

Percent Distribution of Families, By Race and Housing Value

1973, 1975, 1980, 1985

Value*	1973		1975		1980		1985	
	Total	Black	Total	Black	Total	Black	Total	Black
< $10,000	16.25	39.34	16.50	37.34	13.00	33.33	11.25	30.00
10,000-16,000	15.50	22.66	13.50	23.34	13.00	21.67	11.25	20.00
16,000-20,000	10.75	10.34	10.00	10.00	9.00	11.67	8.75	10.67
20,000-24,000	9.25	9.00	7.50	8.67	4.50	8.67	7.50	8.37
24,000-30,000	12.50	8.67	14.25	9.33	16.25	8.00	12.50	10.00
30,000-50,000	21.50	10.00	22.50	11.33	26.00	16.00	26.25	17.63
> 50,000	14.25		16.25		18.25	.67	22.50	3.33

* Value Represents Family Income Multiplied by 2.

Table 42

Consumer Housing Purchasing Power

Alachua County

Percent Distribution of Families, By Race and Monthly Payment

1973, 1975, 1980, 1985

	1973		1975		1980		1985	
Monthly Payment*	Total	Black	Total	Black	Total	Black	Total	Black
< $85	12.00	31.34	11.25	29.34	9.75	26.67	8.50	24.00
85-105	4.25	8.00	5.25	8.00	3.25	6.66	2.75	6.00
105-125	5.00	8.66	3.50	8.67	4.00	7.34	3.75	7.34
125-145	5.00	8.00	5.00	7.67	4.25	7.33	3.75	6.66
145-170	5.50	6.00	5.00	7.00	4.75	7.00	3.75	6.00
170-190	5.00	5.34	5.00	5.00	4.00	6.33	3.75	6.00
190-210	5.75	5.00	5.00	5.00	5.00	5.34	5.00	4.67
210-250	9.25	9.00	7.50	8.67	4.50	8.67	7.50	8.37
250-310	12.50	8.67	14.25	9.33	16.25	8.00	12.50	10.00
> 310	33.75	10.00	38.75	11.33	44.25	16.67	48.75	21.00

Note: Monthly payment represents 25% of monthly income, the maximum proportion of income that should be devoted to housing costs.

* Monthly payment refers to rent, mortgages and other monthly housing costs excluding utilitie maintenance and additions.

Minorities

Using the same method as for estimating the distribution of income within the county, projections were made for the distribution of Black family income, illustrated in Table 43 and 44. It becomes immediately obvious that the housing purchasing power of Black families is considerably lower than for all families within the county. This becomes more evident when reconsidering the information in Tables 41 and 42. Table 43 indicates that by 1985, 69% of the Black families will be unable to afford housing priced above $25,000. Furthermore, 50% of the Black families will be unable to afford a house above $16,000.

Referring again to Table 42, it is possible to estimate the percent distribution of Black families by monthly payment. Remembering that for the county as a whole 11.25% of the families in 1985 will need housing costing less than or equal to $105 per month, the corresponding figure for Black families is 30.00%.

Housing Costs

Statistics compiled by the Federal government indicate that the cost of new housing has increased dramatically in the recent decade. The median sales price of new housing in the United States increased from $18,000 in 1963 to $26,6000 in 1969, and again to $34,100 in 1973, a total increase of 89.4%. This increase is attributable to several factors, notably quick rising land prices, construction costs, including materials and labor, and a consumer affluence reflected in a desire for more square footage per house coupled with more built-in amenities.

Although the largest single component of housing costs is the cost of construction, the most significant increase in component costs is found in land acquisition and improvement. In

Table 43

Alachua County

Estimated Black Family Income By Deciles

1969, 1973, 1980, 1985

Decile	1969 Census	1960 Adjusted	1973	1975	1980	1985
D - 1	$1,100	1,155	1,601	1,683	1,888	2,093
D - 2	1,867	1,960	2,632	2,756	3,064	3,374
D - 3	2,799	2,939	3,918	4,098	4,547	4,997
D - 4	3,667	3,850	5,132	5,368	5,957	6,546
D - 5	4,473	4,697	6,262	6,549	7,268	7,986
D - 6	5,400	5,670	7,634	7,995	8,897	9,799
D - 7	6,667	7,000	9,425	9,871	10,984	12,098
D - 8	8,233	8,645	11,640	12,292	13,707	15,213
D - 9	10,517	11,043	14,979	15,702	17,510	19,317
D - 9.5	12,333	12,950	17,565	18,414	20,502	22,618
Median	4,473	4,697	6,262	6,549	7,268	7,986

Table 44

Alachua County

Percent Distribution of Black Family Income

1969, 1973, 1975, 1980, 1985

<table>
<tr><th></th><th>1969</th><th>1973</th><th>1975</th><th>1980</th><th>1985</th></tr>
<tr><td><$4,000</td><td>42.00</td><td>31.34</td><td>29.34</td><td>26.67</td><td>24.00</td></tr>
<tr><td>4,000-4,999</td><td>11.33</td><td>8.00</td><td>8.00</td><td>6.66</td><td>6.00</td></tr>
<tr><td>5,000-5,999</td><td>9.34</td><td>8.66</td><td>8.67</td><td>7.34</td><td>7.34</td></tr>
<tr><td>6,000-6,999</td><td>7.33</td><td>8.00</td><td>7.67</td><td>7.33</td><td>6.66</td></tr>
<tr><td>7,000-7,999</td><td>6.00</td><td>6.00</td><td>7.00</td><td>7.00</td><td>6.00</td></tr>
<tr><td>8,000-8,999</td><td>4.67</td><td>5.34</td><td>5.00</td><td>6.33</td><td>6.00</td></tr>
<tr><td>9,000-9,999</td><td>5.50</td><td>5.00</td><td>5.00</td><td>5.34</td><td>4.67</td></tr>
<tr><td>10,000-11,999</td><td>7.00</td><td>9.00</td><td>8.67</td><td>8.67</td><td>8.37</td></tr>
<tr><td>12,000-14,999</td><td>4.66</td><td>8.67</td><td>9.33</td><td>8.00</td><td>10.00</td></tr>
<tr><td>15,000-24,999</td><td rowspan="2">2.67</td><td rowspan="2">10.00</td><td rowspan="2">11.33</td><td>16.00</td><td>17.63</td></tr>
<tr><td>≥25,000</td><td>.67</td><td>3.33</td></tr>
<tr><td>Median</td><td>$4,697</td><td>6,262</td><td>6,549</td><td>7,268</td><td>7,986</td></tr>
</table>

the 1957-1966 time period, lot prices in the South Atlantic region increased 69%, second only to the Pacific region where the increases registered 82% (Douglas Commission, 422). The National Association of Home Builders suggest that, on a national scale, land costs in 1969 accounted for 37% of the total cost of a new house (Housing in Florida, Vol. 1, p. 122). This varies with each region.

Data supplied by the Home Builders Association of Gainesville indicate that lot prices in Alachua County have increased dramatically since 1963. A lot that cost $2,000 in 1963 is now estimated to cost between $6,000 and $8,000, an increase of 200% to 300%. Lot prices will vary with lot size, geographical location, and degree of development. A standard lot just south of Gainesville without a paved road, curbs or street drains may cost as little as $3,000. In northwest Gainesville, lots with paved streets and curbs may cost between $6,000 and $12,000, depending on size. Regardless of size and location, the land component of housing costs can only continue to increase in price as demand increases and available land becomes more scarce.

The trend of high costs for materials and labor should also be expected to continue. The costs of materials has increased at an average annual rate of 3.8% since 1963. Furthermore, the price of materials rose nearly 3% between April and June of 1973.

If the costs of land, labor and materials continue to rise at the rates identified above, then estimates of the projected costs of new houses, which in 1973 cost $25,000, are as indicated in Table 45.

On the other hand, median family income is projected to increase only 28% during the same time period. A comparison of the family income projections with estimates of the sales price of new houses suggests that the percentage of families with the potential purchasing power to buy a new home will steadily decrease, as graphically illustrated in Figure 3. By 1985, although the income projections indicate a top-heavy distribution of incomes, fewer than half of the families will be able to sustain purchasing a new home.

Table 45

Alachua County

Estimated Cost of New Single-Family Home

1973, 1975, 1980, 1985

1973	-	$25,000[1]
1975	-	28,000
1980	-	35,500
1985	-	43,000

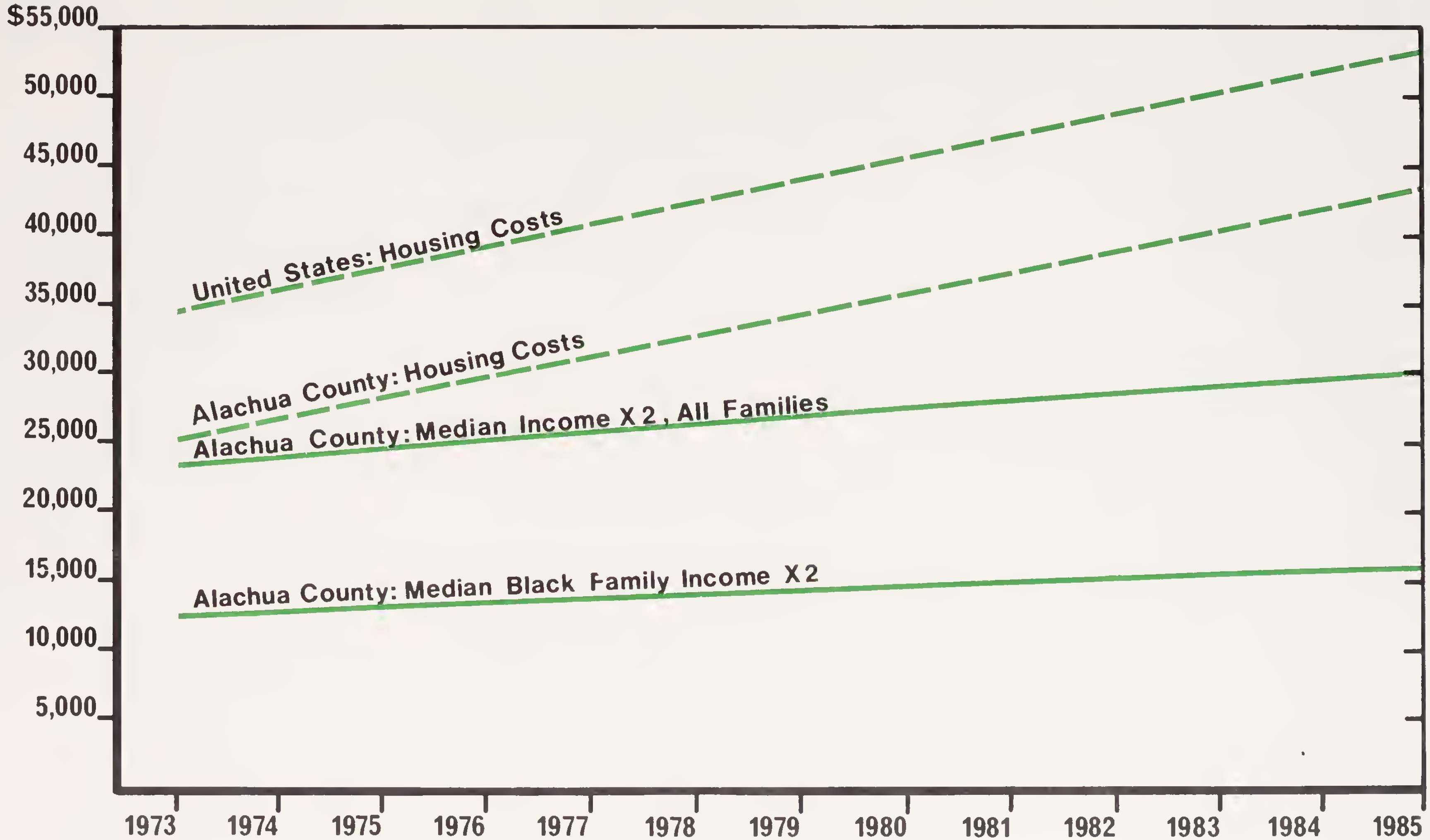
[1]Cost of $25,000 for 1973 is for a 3 bedroom house with approximately 1,200 square feet of living space, on a 100' by 100' lot. (Home Builders Association of Gainesville)

Low Income, Subsidized and Public Housing

Referring to Tables 41 and 42, it is estimated that by 1985, 38.75% of all families in the county will not be able to afford housing costing greater than $25,000. Yet, the typical residential unit is projected to cost approximately $43,000. Although the filtration process may provide houses for a portion of those families who cannot afford new housing, filtration alone cannot be counted on to provide housing for the approximately 28,000 households who cannot afford a $43,000 home.

With the cost of new, single family houses continually rising, it is probably a fair assumption to suggest that new types of housing units will attract more attention. Apartments, condominiums or mobile homes have all increased significantly since 1960 or even since 1970, and there are new concepts, such as modular homes and cluster houses, that may increase in popularity.

However, all housing units have some type of monthly payment, and this is a convenient guide by which to measure the need for low income, subsidized and public housing. Referring to Table 42 it is estimated that 8.5% of all families in the county will not be able to afford monthly housing payments exceeding $85 in 1985. This represents approximately 4,400 families. Furthermore, 18.75% of all families will be unable to afford payments greater than $145. Translating this into housing units, approximately 9,700 sound housing units will be



Housing Costs Versus Housing Purchasing Power

FIGURE 3

needed by 1985 which will rent for $145 or less. The $145 figure is a rather arbitrary one used as a cutoff, and could conceivably be higher by 1985. The point remains, however, that by 1985 there will be a need for approximately 9,700 housing units costing less than $145 per month, for those low income families, and households, such as elderly households, which operate on a fixed income. Whatever portion of these 9,700 units which cannot be provided by filtration or otherwise from the private sector, must be provided by the public sector.

II

HOUSING LOCATION CRITERIA

- Site Planning Criteria
- Water & Sewer Utilities

Site Planning Criteria

GENERAL

Since primitive times there has been a continual need for man to plan his environment. Originally, these needs were to provide security from enemies and predatory animals, protection against weather, and to maintain health and the general welfare of the community.

Because the requirements of civilization are constantly changing, the need to plan is a continuing one. Increasing population and the great variety of new land uses, combined with increased demand for services and greater access to open spaces, make necessary more intensive planning for the development of land.

BASIC NEED FOR SITE PLANNING

Except for the principal considerations of magnitude, scale, and degree of complexity, the basic planning tenets for subdivisions are the same as for larger cities. This section is slanted toward site planning for subdivision developments, and the planning effort required for adequate preparation for such development may be quite complex. A tremendous amount of information is needed for proper development of specific land areas. Not only must active study be given to the physical qualities of an area, such as topography, geology, soils, and drainage, but the physical human needs of utilities, transportation, and cultural characteristics of the prospective population must be assessed to determine design and layout requirements based on human values, reason, acceptability of technological approaches, and suitability to development.

This section of the Housing Study will deal primarily with those physical qualities that must be considered in development

site planning, including a discussion of topography, climate, geology, and drainage. Because the presence or absence of water and sewer utilities provides local government considerable control over developmental direction, a discussion of these basic utilities will also be included.

SOURCES OF INFORMATION

Prior to actual subdivision site planning, there are several important sources of information that may furnish data on physical parameters. Such basic data may, with little effort, provide the planner or reviewing agency with enough information to determine whether any serious limiting conditions are prevalent in the area to be developed. A thorough pre-planning effort can be of great value to determining final design criteria and requirements to allow for the most economical development and most efficient overall plan for which local governmental bodies can reasonably provide services.

Series of maps useful in planning are available from agencies of the Federal and state governments. The most commonly available maps are from the United States Geological Survey (U.S.G.S.), a division of the Department of the Interior. The Geological Survey office produces standard topographic maps covering the entire United States. Each map is bounded by parallels of latitude and meridians of longitude. These "quadrangle" maps are produced in three series: a 7-1/2 minute series covering 7-1/2 minutes of latitude and longitude at a scale of 1:24,000; a 15 minute series covering 15 minutes of latitude and longitude at a scale of 1:62,500: and a 30 minute series covering 30 minutes of latitude and longitude at a scale of 1:125,000. These maps (called U.S.G.S. maps) are available through Distribution Section, U.S. Geological Survey, 1200 South Eads Street, Arlington, Virginia, 22202 and at local distribution centers.

The U.S.G.S. maps contain three basic types of data: cultural features; water features; and topographic relief. Cultural features include roads, railroads, cities, and towns. Water features include lakes, rivers, streams, and major intermittent channels. Topographic relief is shown with contour lines and spot elevations. The contour intervals vary from map to map depending on the scale and the relief of the country.

Some maps include additional information such as woodland areas, limits of urbanized areas, highway classifications and the boundaries of major public land areas. Index maps, by state, are available from the Distribution Section of the U.S.G.S. and local distributors showing the maps available in the state and their titles.

Maps which show topography and other features for much of Alachua County can be obtained from the State Department of Transportation, the North Central Florida Regional Planning Council, and the County Engineer. Aerial photographs are available for purchase or examination for many areas of the county through the North Central Florida Regional Planning Council, the County Forestry office, and at least one commercial establishment. Such photos are often quite useful in assessing subsurface structures, drainage patterns, vegetation coverage, and surrounding land use.

Information on rainfall records, stream flows, flood limits and other pertinent records are available through the U.S. Weather Bureau and the U.S. Geological Survey (U.S.G.S.). The U.S.G.S. and the Florida Geological Survey have on record considerable data on area-wide geologic conditions, as well as data on ground and surface water availability and quality.

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The U.S. Soil Conservation Service through county agents can usually provide a wide variety of information on soil types and capabilities. The Alachua County agent has available general soils maps for the county at a scale of one inch to four miles. In addition, descriptive information is available on each soil type indicating general soil capability for a variety of uses, such as, but not limited to, septic tanks, woodland suitability, and ground water levels.

Various other maps are available in Alachua County showing existing zoning, present and projected land uses, and land ownership. None of this information, however, should be used in lieu of actual field reconaissance. Anyone involved in site planning or evaluation should become fully acquainted with the physical characteristics and peculiarities of an area which in many instances are not indicated on published maps or included in available data.

TOPOGRAPHY

Limiting Effects of Topography

Urban development tends to follow landform's path of least resistance modified by the technology of the period. For example, it may often be observed that rivers and valleys tend to channel urban expansion; major highways and railroads tend to follow river channel routes because of the generally gradual continuous grades; and bridges that often open up new areas for development tend to be constructed at the narrowest points of rivers or where the river is shallow and exhibits a hard bottom and easy access grades. Therefore, topography may often, to a large extent, help shape the total pattern of growth.

Topography, or land form, interacts with those physical characteristics that help shape or form it, such as type of soils, drainage pattern, climate, and vegetation. Therefore, because of its imposition on the natural environment, land development must insure the stability of topography during the physical development of sites by providing adequate grading (slope stabilization), drainage and use suitable soil structures in order to make the best use of the construction site within the limitations set by the topography.

Slope Use Zoning

Within the framework of construction practices and technology there are certain slopes, or ranges of slopes, upon which certain types of construction can be most economically undertaken. This concept is referred to as slope use zoning.

On certain specific slopes the cost of construction to meet the common needs of certain land uses will be minimized. This cost of construction, as reflected in the consumer cost, includes not only the cost of the structures, but also the costs of site preparation, site development, utility services and the provision of necessary drainage facilities and access roads. The following outline illustrates the land uses that would exist in an area, if economy in physical construction based on ground slope qualities was the only influence on urban form and structure. It also generally summarizes the developmental restrictions imposed by topography.

Slope Range:	0-1%
Industry:	Large scale lineal production uses. (Slopes greater than this either interfere with production line methods or increase construction costs.
Commerce:	(Expensive due to drainage problems.)
Residence:	(Expensive due to drainage problems.)

Roads:	(Expensive due to drainage problems.) Dangerous due to standing water and fog.
Recreation:	Picnic and informal small-group field sports, not intensive. (Difficult ground drainage and expensive artificial drainage systems make provision for organized or intensive sport-recreation use expensive.)
Agriculture:	Truck crops in flood plain areas, general farming elsewhere.
<u>Slope Range</u>:	<u>1-3%</u>
Industry:	Moderate and small plants without extensive lineal production, trucking terminals, warehouses.
Commerce:	Commercial developments of all types, especially well-suited to large-scale "shopping center" development and parking lots. (Good natural drainage, easy slopes, easy truck and auto access.)
Residence:	All types: single family, multi-family, town house, high rise.
Roads:	In any pattern. Landform in no way influences the geometry of the road system.
Recreation:	Playgrounds, and playfields, intensive picnic, intensive informal field sports, camping. (Sufficiently flat for organized field sports, yet sufficiently sloped for good natural drainage.)
Agriculture:	General farming.
<u>Slope Range</u>:	<u>3-5%</u>
Industry:	Intensive small-scale industry with minimum trucking needs.
Commerce:	Small scale individual commercial structures. (Parking areas must be terraced.)
Residence:	Clustered single-family residences and multi-family residences, town houses and high rise units. (With terraced parking lots, or parking garages).
Roads:	(Truck roads must run parallel with, or diagonal to, the contours. High speed roads similarly limited.)

Recreation:	Playgrounds, playfields, picnic, informal field sports, camping in 3-4% only. From 4-5%--picnic, informal field sports, golf course, nature trail, natural hiking area, camping.
Agriculture:	General farming.
<u>Slope Range</u>:	<u>5-12%</u>
Industry:	Intensive small industry on slopes up to 7%. (Truck access difficult if not impossible.)
Commerce:	Small scale individual commercial structures on slopes from 5-8%. Economic construction practically precluded on site with slopes over 8%.
Residence:	Clustered single-family residence and multi-family residences. (Upper-middle income on 5-8% slopes, high income on 8-12% slopes.) Town house and high rise. (With terraced parking lots, or parking garages.)
Roads:	(Truck roads and high speed roads must run parallel with the contours. In areas of slope over 8%, road routing is virtually dictated by the terrain and roads parallel with or diagonal to the contours create serious problems of access to the abutting properties due to the need cut and fill of the roadway, whereas roads perpendicular to the contours require long cuts and fills).
Recreation:	Golf course, nature trails, camping hiking.
Agriculture:	General farming from 5-8%. Specialized farming from 8-12%.
<u>Slope Range</u>:	<u>Over 12%</u>
Industry:	(Economically impractical.)
Commerce:	(Economically impractical.)
Residence:	Isolated high income single family residence on large lots. Ultra High income prestige apartment towers with internal parking.
Roads:	(All types extremely expensive.)
Recreation:	Isolated small picnic sites, nature trails, hiking, wilderness camping (no auto access).
Agriculture:	Specialized farming on slopes near 12%, pasture. Without machinery.

(C & RP 842)

Obviously slope use zoning is not the only influence on land use development; however, it does often greatly modify developmental form and structure.

CLIMATE

General

The study of local climate is necessary if good living conditions for people and plant life are to be obtained. Topography, altitude and exposure (or protection) by neighboring landforms or windbreaks will affect temperature and wind velocities. Proximity to coast or industries will affect the light factor and produce salinity or fog and air pollution. The seasonal variation of temperature and humidity of the air due to geographical positions will affect the detail planning of a locality, and even small areas within a locality such as parks and woodlands.

Climatological data can be obtained from U.S. Weather Bureau publications for five stations located within the county. Two of these stations are in the Gainesville area and the other three are located in High Springs, Melrose, and Island Grove. Gainesville's weather monitoring stations keep records of precipitation, temperature, and evaporation, and maintain both recording and non-recording gauges. Precipitation and temperature records for the area are available for a period of more than 60 years up to and including 1956, from the old University of Florida station at Gainesville. (Comprehensive Area-Wide Plan for Water and Sewer Development, p. 2-7.)

A general description of local climate for Alachua County and north central Florida may be found in many locally-available publications including the two bibliographical references

of: Comprehensive Area-Wide Plan for Water and Sewer Development for Alachua County; and Clark, et al, Water Resources of Alachua, Bradford, Clay and Union Counties, Florida.

Influence of Climate on Urban Structure

In general, there are eight primary determinants of climate quality that influence urban structure and development: (1) latitude, (2) altitude, (3) landform, (4) water bodies, (5) temperature, (6) wind, (7) humidity, and (8) precipitation. Variety in the combination of these determinants results in the wide variety of local climatic conditions. The following discussion describes the more important of these aspects that pertain to climatic considerations in Florida that are not mentioned in other sections of this study.

The latitude of an area determines the amount of time during which the sun can shine on any day of the year. Therefore, the further a place is from the equator, the less will be the angle made between the sunlight and the surface of the ground at any given time. Moving away from the equator results in a decrease in solar radiation per square foot of horizontal area and sun brightness due to increased filtration of the sun's radiation by the earth's atmosphere. The general maxim, therefore, for site locations in hot climates is that areas affording natural shading by vegetation and landforms are desirable for development locations.

In Florida with elevations ranging to only about 400 feet, altitude is not a major factor in development site selection. Slope changes are relatively gentle, and there is insufficient variation in altitude to warrant special planning effort.

Where all other influences on local climate are constant, variation in landform will result in variation in climate.

In the Northern Hemisphere, south slopes will be warmer than flat land because they will receive more direct sunlight. During the summer months, slopes facing to the southwest will be even warmer than south-facing slopes, but they will be colder than south-facing slopes in the winter. In general, steep north slopes are inevitably the coolest areas as they receive virtually no direct sunlight at any season of the year. Hollows and areas at the foot of long slopes collect cold air. Cold air "flows" into them from higher areas, sometimes resulting in temperatures that are 10° to 15°F colder than surrounding areas. Landforms may also channel, redirect, and intensify prevailing winds. In general, it is preferable to locate residential areas on south or southeast facing slopes. East slopes are superior to west slopes to take advantage of the rising sun and avoid the direct rays of the hot afternoon sun. And it is better to keep structures up on any slope than in the bottom of a valley to take advantage of prevailing winds.

Water bodies, such as rivers, lakes, and oceans have a great influence on climate. Water temperatures fluctuate slower than air temperatures. During the summer months, water areas absorb heat slowly during the day and release it slowly during the night. Nearby land areas are generally cooler during summer days, but warmer at night, than comparable areas that are not near water bodies. The same process occurs on a larger scale with regard to the seasons. Water areas absorb heat in the summer and release it during the winter, making the climate of nearby land areas cooler in the summer and warmer in the winter. Bodies of water, particularly large water areas, tend to equalize temperature extremes. In general, development locations near water bodies are highly desirable because the variations in daily temperature will remain more stable than surrounding areas.

In a consideration of temperature, it can be observed that heat absorbed by materials during the day is released

during the night. In climates where summer heat is high, low reflectivity, or high absorbtion, often results in very hot night temperatures. The variation in relative heat gains in materials is illustrated in Table 46 below.

Table 46
Heat Absorption Characteristics of Selected Ground Surfaces

Ground Surface Material	% of Total Sun's Heat	
	Reflected	Absorbed
Bare rock	12-15	.85-88
Bare ground	9-25	.75-91
Grass	32	68
Green Fields	3-15	.85-97
Desert	24-28	.72-76
Brick	23-48	.52-77
Asphalt	15	85

(C & RP 842)

In order to offset undesirable temperature conditions in warm areas, efforts should be made to maximize shading and minimize heat absorption. In addition to building shading, shading from trees affects local climate. Deciduous trees permit summer shading but lose their leaves in the winter permitting sunlight and heat to penetrate. Careful siting of development areas in relation to tall deciduous trees in dense groups can result in a natural season-adjusting shading system providing protection in the summer months and exposure to sunlight in the winter months. The use of asphalt streets in hot climates (great heat absorption) should be avoided. The buildup of dark (heat absorbant) ground surface materials, particularly on the south and southwest sides of developments

that are close to structures and other areas occupied by people, will raise the temperature of the immediate area.

Wind has a decided effect on the temperature perceived by people. This is called "sensible" temperature. The human body is cooled by evaporation of perspiration, achieved by air movement and low air humidity. In warm weather, anything that reduces air movement or increases humidity will give the impression of greater heat. The heat loss (cooling effect) of both people and buildings is affected by wind.

High buildings impede high winds and create wind-sheltered zones behind them. This wind protecting effect is maximized where there are tall, wide, thin buildings located perpendicular to the direction of the wind, and where wind is permitted to penetrate the building mass at a few points to reduce turbulance in the air behind the structures. Such buildings may be effectively used to create wind shelters for uses and other lower buildings located behind them. Thick clumps of trees can also provide wind protection, reducing wind velocity by as much as 50% where the clumps are of substantial size and consist of high trees. But it must be remembered that deciduous tree clumps will have little effect on winter winds as they lose their leaves, and that tree groups that are oval in shape provide little wind protection. Where either buildings or tree clumps are used to create wind-protected zones, their protecting effect will generally be limited to an area behind these wind barriers that is not greater in depth than ten times the height of the barrier.

Street systems should be oriented to admit summer breezes, particularly between noon and 6 P.M., yet block winter winds

(if differences in summer-winter wind direction permit). Wind carries sound, odor and dustlike solids. Industries, airports and other major noise producers should be located down wind from residential, commercial and office use areas, as should sewage disposal plants, stock yards, sanitary land-fills, industries that produce smoke or odor and producers of wind-carried solids such as concrete plants.

GEOLOGY

General

In many cases, insufficient data has been accumulated on subsurface conditions for proper site planning. Subsurface explorations should be made in all areas of potential development where the preliminary study calls for the location of major structures. Such explorations may indicate unsuitable subsurface conditions which would require large expenditures of money to accommodate planned structures. At times such studies may suggest alternate areas for locating such structures and the original overall land plan may be used and materially reduce construction costs. Field investigations to determine surface and subsurface conditions at a site should be made as soon as possible. Often, considerable expense can be saved if explorations are made before a site is purchased.

Sources of Subsurface Information

There are several sources that have information available on subsurface features. Thorough research is to be recommended because much useful information may be obtained at little cost and potentially produce great savings in construction. The U.S. Geological Survey has prepared geologic quadrangle maps for many localities in the United States using the standard U.S.G.S. topographic maps as base maps upon which the various subsurface formations and structures have been superimposed. These maps are not available for Alachua County. General information, however, is available through published reports of the Florida Geological Survey which may be obtained by writing to the Department of Natural Resources, Division of Geology, c/o P. O. Drawer 631, Tallahassee, Florida 32304. Data obtained from published U.S.G.S. Water Resource Bulletins

provide a great deal of information on subsurface conditions from logs of water wells constructed in all parts of the state. These records contain a wealth of information useful to planning, such as soil strata, groundwater elevations and location of bedrock. Quite often additional information of this nature may be obtained through local well drillers, the County Health Department, and the County Engineer. The U.S. Department of Agriculture, particularly the Soil Conservation Service, may also have valuable information of particular areas, and should be consulted.

Site Investigation Methods

There are numerous techniques available for site investigations. They vary in cost from relatively inexpensive visual inspection to costly subsurface explorations and laboratory tests. The actual techniques employed and to what extent they are utilized depends upon the type of structures to be built, the cost of construction, the relative cost of an overly conservative design, findings of the preliminary investigations, and sound engineering judgement based upon an evaluation of the consistency and validity of existing information.

On-site visual inspection is an essential preliminary step to good site planning. A complete inspection should provide information on surface soils, surface water, slopes, accessibility for heavy equipment, existing structures, adjacent construction, and type and density of vegetation. It may also be possible to determine if there is a potential for underground utilities to cross the site. Geological surveys can provide much information on subsurface soil and rock conditions. The geological survey will identify distinctive landforms such as ancient shorelines, structure-

induced landforms, terraces, and weathered remnants of rock formations. Based on such observations, a geologist can often deduce the nature of materials in various parts of the site and often identify locations of useful on-site natural resources. Although geological surveys are particularly useful prior to subsurface explorations, usually time and cost factors restrict such studies to large projects, such as dams, highways, and airports.

Aerial surveys likewise may be quite costly and practical primarily for only large areas. They may be used to identify landforms, drainage patterns, vegetation types, land uses, and soil and rock characteristics of an area. Such studies are unsuitable for heavily wooded or built-up areas. The availability of recent aerial photographs of good quality, however, may provide much of the desired information on existing land conditions for local areas with relatively little effort and cost, without the expense of a complete aerial survey and professional interrpretation.

Several of the more common methods for ascertaining subsurface soil and formation characteristics are briefly outlined below:

1) Geophysical methods provide, by various types of remote sensing techniques, a great deal of subsurface information without a large number of borings. They can map large areas faster and at less cost than methods involving borings alone. These methods relate electrical resistivity, shock waves or other induced stimuli to significant subsurface soil or rock characteristics.

More conventional methods involve some type of physical subsurface measurement.

2) Probing derives subsurface data from driving a rod or pipe into the ground and measuring penetration resistance.

3) Augers provide data by actually drilling into the earth and bringing up disturbed soil samples.

4) Test pits permit visual examination of soils in place but are limited by expense and difficulties of excavation.

5) Rotary drilling employs powered equipment to rotate a bit capable of reducing the most compact soil or rock formation into chips.

All these methods have limitations of one kind or another, but each is useful for performing certain jobs where a particular type of information is needed. Usually the preliminary site investigations and research may indicate what methods for additional data gathering should be employed and if such information is necessary. (Merritt, p. 7-12, 13.)

Local Planning Considerations

Three of the most costly subsurface conditions encountered during construction are high water tables, unstable soils and solid rock. Locations of such unfavorable subsurface conditions should be clearly established prior to master plan preparation and a consideration of these conditions is necessary for the establishment of land uses.

Alachua County is varied enough in the subsurface to warrant a thorough search of available material prior to site planning. The western portion of the county is noted for its karst topography which is typified by a relatively flat limestone plain having numerous solution features with limestone bedrock relatively close to the surface. Many areas have only a surficial soil covering. Other areas because of soil type and characteristics of underlying formations exhibit high water tables, unstable soil conditions, and other features which make construction difficult, costly, and often prohibitive to certain types of development. Clearly, it is only good planning to ascertain subsurface suitability before actually beginning the site plan.

SOILS

Definition

Soils may be defined as all that earthy material lying above bedrock that, as a result of physical, chemical, and biological processes, has become a mixture of "fragmented and weathered rocks and minerals, organic matter, water, and air in greatly varying proportions usually having more or less distinct layers or horizons which have developed under the influence of climate and living organisms." (Flawn, p. 4)

Problems sometimes arise when the developer must evaluate reports by the geologist, the soil scientist, and the engineer to whom the actual definition of soils may differ considerably. To the geologist, soil is what rock becomes through weather and encompasses all that material between the earth's surface and bedrock. The soil scientist may evaluate soil as that naturally occurring body of material at the earth's surface which contains living matter and is capable of supporting plant life. Such a definition usually assumes as a lower boundary the limit of common rooting depths of native plants. The engineer, who is generally concerned with the mechanics of soils, regards soil as all that loose or unconsolidated material which lies on hard rock. Thus, the geological definition is one of genetic origin: a product of physical, chemical, and biological processes; the soil science definition is a descriptive biological tenet; the engineering definition is one that principally defines physical parameters.

The planner is in the position of having to coordinate these types of reports and of making beneficial use of them. Care, therefore, must be taken to adequately understand the source of any soils information. (Flawn, p. 3-6.)

Influence of Soils on Development

Although soil structure greatly influences urban form and structure, it does not dictate these things. Soil structure simply places conditions on urban development. Soil structure qualities usually limit potential urban developments to use types that can be inexpensively accommodated on the soil until such time as the additional expenditures required for the provision of technological devices to overcome the limitations of the soil can be economically justified by the demand for more intensive use of the land. Foundation engineering can compensate for soil inadequacies but only at a greater cost. The economic justification must be high to compensate for engineering design and special foundations necessary where soils are inadequate for the proposed uses.

Soil Characteristics

Of the many soil characteristics that can, upon measurement, yield valuable information on limitations and potentialities of development on the various varieties of soils, the characteristics described in the following paragraphs are commonly used in subdivision, highway, and foundation engineering. Following a preliminary site survey, the soils engineer can usually recommend those tests applicable to any particular area.

Two of the characteristics that have a great influence on development are bearing capacity and shearing strength. The bearing capacity of a soil is the maximum weight per square foot, usually measured in thousands of pounds, that the soil can safely carry. The bearing capacity of soils greatly influences the kinds of structures that can be most economically built on them. Since most soils are stratified in layers of varying soil types

and qualities, the limiting soil qualities are not those of the soils at the surface of the ground, but those of the soils at or below the level of the foundation supporting a structure.

The following outline describes by broad soil classification the general soil qualities of each category in regard to its load bearing characteristics.

General Soil Qualities

<u>Solid soils</u>:	including rock, bedrock and hardpan are the most stable foundation materials and are capable of supporting the greatest weight. They are generally subject only to seismic movements.
<u>Coarse soils</u>:	(gravel and sand) are generally stable foundation materials and are capable of supporting heavy loads. When free of silt and clay, they are pervious to moisture, well-drained and are little affected by moisture.
<u>Fine soils</u>:	(silt and clay) have considerably less load-carrying ability than coarse soils and are usually limited to a maximum load bearing capacity of two tons per square foot. As sand particles become finer and more uniform in grain size, they approach the characteristics of silt. Fine sand and silt have limited permeability and are unstable in water. They go "quick" when saturated, tending to flow with little resistance. Clay is plastic. It retains its form when wet and does not go "quick"; when dry, it is often satisfactory for light structures. It is impervious to moisture and virtually impossible to drain. These are generalities, however, and exceptions to the above do exist.
<u>Organic soils</u>:	tend to create voids by decay and the creation of gases. They are highly unstable.

Filled ground: (relocated earth or garbage) is subject to shrinkage and uneven settlement due to uneven consolidation of material and is generally unsuitable for all types of structures. Garbage fill is also organic.

(C & RP, 842)

Shearing strength is defined as "the shear stress in a soil mass at failure or when continuous displacement occurs at a relatively constant stress." (Merritt, p. 7-9, 10.) Shearing strength tests are useful for determining structural strength characteristics of a soil type. Such measurements are usually made in a laboratory and measure a soil's resistance to lateral force under a normal load. Shearing strength often is an important factor in determining ultimate bearing capacity of a soil and the stability of embankments. It varies with type of soil, depth, and structural disturbance. It also varies with seasonal changes in groundwater level, moisture content, and seepage.

Other types of soil characteristics include permeability and consistency. The degree of permeability (which is the ability of a soil to conduct water under a hydraulic gradient) depends on soil density, degree of saturation, particle size, and effective porosity. Moisture, or water content of a soil, is an important influence in soil behavior.

Consistency generally describes the condition of fine grained soils and is measured by the Atterberg System which recognizes four states or conditions: liquid, plastic, semisolid, and solid. These conditions change with varying moisture content of soils. Although the Atterberg System is used primarily with soils that are to be compacted, the tests do yield some generally useful data on characteristics of fine grained soils.

Effects of Soil Structure on Site Locations

In addition to placing limits of the location of sites for the most economical construction, soil structure also greatly influences the location and form of septic tank-served developments, widths of roads and railroad rights-of-way in areas requiring cut and fill, and the location of extractive industries, such as gravel and sand borrow pits and mining operations.

When septic tanks can be placed in soils with good absorptive capacity, they provide a suitable means for sewage disposal for low density housing. The successful operation of septic tanks depends upon soil permeability and the absence of groundwater near the earth's surface.

In areas requiring cut and fill for roads or railroads, the angle of repose of soils in which the cut is made, and of the soils of which a fill is created, can not be exceeded. Areas of cut and fill must be within the right-of-way limits. The greater the angle of repose of the soil, the less right-of-way width will be needed to keep the finished slope of cut and fill areas within right-of-way limits. Soils with a very small angle of repose require wide right-of-way widths to keep slopes of cut and fill areas within the right-of-way.

Areas of clean sand, gravel, and sand and gravel mixtures that are near the surface of the ground will tend to be used as resource sites through excavation, provided that the water table at these areas is sufficiently low to permit excavation of a vast mass of these materials without undue flooding. Such potential resource sites are particularly prone to development if they are located a short distance from an urban area and in close proximity to a major road.

In addition to having an adequate soil bearing capacity, it is essential that sites for extensive horizontal structures have a uniform soil quality throughout the area the structure is to occupy. Cracks in structures, and structural failure, usually result from uneven settlement rather than from the sinking of the building.

Soil Surveys

The basic sources for soil structure data are: the State Department of Natural Resources; the U. S. Department of Agriculture, Soil Conservation Service; and the Florida Department of Agriculture and Consumer Services, Soil and Water Conservation Service. In addition, other pertinent data is uaually available from the University of Florida, Department of Agriculture, Agricultural Experiment Station, and the Department of Geology. The offices of city and county engineers often maintain detailed data files on local soil conditions.

Although originally intended to aid the farmer in selecting land best suited to various agricultural needs, present day soil surveys now include a great deal more information and are of use to planners and engineers, as well as developers, homeowners and local governments, to aid in determining the best use of the land.

A soil survey includes determining which properties of soils are important, organizing knowledge about the relations of soil properties and soil use, classifying soils into clearly defined units, locating and plotting the boundaries of the units or maps, and preparing and publishing the maps and reports.

The Soil and Water Conservation Service upgraded the original (1940) agriculturally-oriented soil survey in 1954, and

included in their report a general soil map of Alachua County at a scale of one-inch to four miles. Comprehensive Plan Report No. 1 by the Gainesville Department of Community Development entitled Physiographic Survey includes a brief description of the various soil series that occur in the Gainesville area and evaluates their suitability for various types of urban development. Further information of this type is to be found on the Soil Survey Interpretation Sheets compiled by the Soil and Water Conservation Service. These sheets contain for each soil type a description of:

1) estimated physical and chemical properties;
2) suitability and major features affecting soil as a resource material;
3) degree of limitations and major soil features affecting selected use;
4) degree of soil limitations and major features affecting recreational development;
5) capability, soil loss factors, and potential yields of some agricultural products;
6) woodland suitability; and
7) wildlife suitability.

An example data sheet for one soil type is included in Figure 4. This data is as yet unpublished but available upon request for most soil types from the local Soil and Water Conservation Service office.

Engineering soil survey information for Alachua County may also be found in Technical Report No. 1, May, 1952, by the Civil Engineering Department, Engineering and Industrial Experiment Station of the University of Florida in cooperation with the State Road Department of Florida. This report provides an evaluation of the engineering parameters for each soil type and a map of Alachua County illustrating the distribution for each soil.

MAP SYMBOL ________

DELRAY SERIES

SOIL SURVEY INTERPRETATIONS

These are very poorly drained, sandy soils with a high water table. They have a thick, black surface horizon that is moderate to very high in organic matter, and a thick, gray, sandy subsurface horizon. Below the subsurface horizon they have layers of dark grayish brown, fine sandy loam and grayish brown loamy fine sand. These soils occur on low, broad flats, or depressions in the Southern Florida Flatwoods and the Florida Everglades and Associated Areas. Slopes are less than 2 percent.

ESTIMATED PHYSICAL AND CHEMICAL PROPERTIES

Major Soil Horizons (inches)	Classification: USDA Texture	Unified	AASHO	Coarse Fract. >3 in. %	Percentage Less Than 3 Inches Passing Sieve No.-- 4	10	40	200	LL	PI	Permeability in/hr.	Avail. Water Cap. in/in.	Soil Reaction	Shrink-Swell Potential
0-18	fs,s,ls	SP-SM, SM	A-2-4, A-3	0	100	100	95-100	5-15	NP	NP	6.3-20.0	.15-.25	5.6-7.3	low
18-46	fs,s	SP-SM, SM	A-2-4, A-3	0	100	100	95-100	5-15	NP	NP	6.3-20.0	.05-.08	6.1-7.3	low
46-60	fsl,scl	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	95-100	20-35	NP-30	NP-12	.63-6.3	.10-.15	6.6-7.8	low
60-75	lfs,ls	SM	A-2-4	0	100	100	95-100	13-20	NP	NP	2.0-6.3	.07-.10	7.4-7.8	low

Depth to rock: Rock free — Hydrologic Group A/D

Flood hazard: Depressions are flooded (ponded) for more than 6 months annually.

Wetness: Water table is at depths of 0 to 15 inches for more than 6 months in most years.

SUITABILITY AND MAJOR FEATURES AFFECTING SOIL AS RESOURCE MATERIAL

Topsoil	*Fair; Fine sand, sand or loamy sand texture, moderate to very high in organic matter but high water table may be a hazard to the use.
Sand	Fair; Probable source but high water table may be a hazard to the use.
Gravel	Unsuited; Improbable source
Roadfill	Good; high water table may be a hazard to the use

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE

Pond reservoir areas	Severe; permeability
Pond embankments	Severe; sandy material, rapid seepage rate, piping hazard
Excavated ponds (aquifer fed)	Slight
Corrosivity - Uncoated steel	High; high water table and texture
Corrosivity - Concrete	Low
Dwellings	Severe; high water table
Septic tank filter fields	Severe; high water table
Sewage lagoons	Severe; high water table, permeability
Local roads and streets	Severe; high water table
Light industries	Severe; high water table
Sanitary landfill (Trench type and Area type)	Severe; high water table, permeability

U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, FORT WORTH, TEXAS

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Delray Series

DEGREE OF SOIL LIMITATIONS AND MAJOR FEATURES AFFECTING RECREATION DEVELOPMENT

Camp Areas	Severe; high water table
Picnic Areas	Severe; high water table
Playgrounds	Severe; high water table
Paths and Trails	Severe; high water table

CAPABILITY, SOIL LOSS FACTORS, AND POTENTIAL YIELDS--(High Level Management)

Phases of Series	Capability	Soil Loss K	T	Oranges 90# Bx.	Grapefruit 85# Bx.	Tomatoes 40# Bx.	Cabbage 50# Crate	Sweet corn 40-60# crates	Pasture AUM
0-2%	IIIw	-	-	425	500	300	480	180	Grass 8.5 Grass & clover 10.5
Ponded	VIIw	-	-	-	-	-	-	-	-

WILDLIFE SUITABILITY

Phases of Series	Potential for Habitat Elements: Grain and seed crops	Grasses, legumes	Wild herbaceous plants	Hardwood trees and shrubs	Low conifer. plants	Wetland food and cover	Shallow water devel.	Potential as Habitat For--: Openland Wildlife	Woodland Wildlife	Wetland Wildlife
0-2%	Poorly suited	Poorly suited	Suited	Poorly suited	Suited	Well suited	Suited	Poorly suited	Poorly suited	Suited
Ponded	Un-suited	Un-suited	Un-suited	Un-suited	Un-suited	Well suited	Well suited	Un-suited	Un-suited	Well suited

WOODLAND SUITABILITY

Phases of Series	Ord.	Potential Productivity: Important Trees	Site Index	Important Understory Veg. (Med. canopy)	lbs/ac	Woodland Management Problems: Erosion Hazard	Equip. Limit.	Seedling Mortality	Trees to Plant
0-2%	4w3	Slash pine	70			Slight	Severe	Severe	Slash pine
		Longleaf pine	60						

RANGE

Phases of Series	Range Site Name	Potential productivity (climax) of important species--lbs/ac	Dry years	Wet years
All phases	Sand Pond-Slough	Maidencane, toothache grass, hairy bluestem, broomsedge, longleaf and pineland threeawn, and bluejoint panicum.	1,000-2,000	1,800-3,500

OTHER

Figure 4

DRAINAGE

General

That portion of precipitation that is neither absorbed by the soil nor transpired by plants and trees or returned to the atmosphere by evaporation is called "run-off". Run-off collects by "sheet flow" where the direction of flow corresponds to lines perpendicular to contours and is tnereby directed by local topography into streams and rivers.

Run-off tends to follow the easiest route to the lowest level of the surrounding land. Run-off creates its own most efficient drainage pattern--the natural stream flow pattern. It can be accommodated in underground storm sewers that do not follow the natural surface drainage patterns, but if the natural surface drainage pattern is utilized as the basis for urban development, tne need for expensive underground storm sewers will be minimized.

Because of the relatively high cost of drainage facilities, it is mandatory that careful consideration be given to run-off controls both prior to and during actual development of an area. Inadequate storm drainage systems may cause flooding and damage to private property along with associated problems of siltation and erosion. It may also be the cause of expensive legal proceedings if such planning is neglected.

The cost of providing drainage facilities is frequently one of the largest single costs in the orderly development of an area. The land use selected for each section directly affects the drainage cost. In many instances where one use of the land could not economically justify construction of a storm sewer system, such as in single-family residential areas, a different use, such as industrial or commercial development, could easily support the costly construction of a closed storm system.

Assignments of major land uses should ideally consider preliminary run-off quantity calculations and general alignment of major drainage facilities. Other items affecting the cost of development of any land area should also be evaluated in relation to drainage requirements at the preliminary design state.

Natural stream channels usually provide the most economic means for collecting and transporting run-off to points of disposal. The actual volume of water to be transported, however, is the primary consideration when choosing between a closed storm sewer and an open channel.

The Storm Drainage System

The storm drainage system is similar to sanitary sewers in that both are gravity systems. They are commonly linear-branched systems, having a continuous downgrade from the highest point in the system to the lowest point in the system, the outfall, where the trunk of the system empties into a natural channel.

Storm drainage systems usually consist of four components: drainage ditches, street gutters, storm sewers, (underground pipes to carry run-off) and natural channels. In these systems, storm run-off flows from buildings and surrounding property to either storm sewers, street gutters or drainage channels in the street right-of-way by means of drain pipes or surface flow. The storm drainage system combines this water with run-off from ground surfaces and street paving and conducts it to an outfall which empties into a natural drainage channel. Storm sewers should only be provided where natural channels: cannot handle run-off without undue economic investment, where the location of open channels constitutes a public safety hazard, or if the economic advantage of intensified land use warrants underground conduits.

Street gutters should not be made to carry run-off further than approximately 800 feet before dumping it into an open channel or storm sewer inlets. The underground conduit system is designed much the same as the sanitary sewer system.

Drainage Planning Considerations

With regard to run-off quantity, the total amount of rain that falls is not as important as the intensity of fall. A light rain over a long period of time will not result in as much run-off as a short intense rain, as it quickly saturates the ground. In planning design, drainage channels are designed to accommodate the amount of run-off generated by the most intense rainfall, expressed in inches per hour, that can be expected every 5, 10, 25, 50, or 100 years. The most intense rainfall expected at these frequencies is often expressed in terms of the hourly equivalent of the maximum 20-minute storm as well as in terms of the maximum rainfall per hour.

Due to their great cost, storm sewer systems are often designed for 10 to 25 year intensity storms; the expense of providing for the 100-year storm is ordinarily too great for a community to afford. Because of this, one of the primary purposes of ground drainage design (precluding the disasterous effects of the uncommon storm) is defeated. The primary aim of surface drainage design is to keep the run-off from uncommon storms moving at a reasonably slow speed (to prevent erosion and maximize absorption) within established channels set aside for this purpose. The natural surface channels are most rationally the backbone of such a system and as such should become a part of the basic structure of the community, influencing the location and qualities of all other land uses.

Streets should be designed as components of a comprehensive, integrated drainage system. They generally are located a few

inches below the level of the surrounding ground and, therefore, collect sheet run-off from surrounding areas. In addition, these paved areas absorb very little of the precipitation that falls on them.

Streets often account for one-third to one-sixth of the total urban area. Street construction significantly alters run-off. The great amount of water that runs off their surfaces must be safely carried along their rights-of-way to safe outlet. Because of this, dips along streets and downhill cul-de-sac conditions should be avoided as they necessitate drainage easements or the purchase of ground to permit them to be drained. All streets should have a minimum running grade of .5% to assure the continuous movement of run-off along their surfaces, and a cross-slope of at least 2% to permit sheet flow to be collected at the sides of the roads, in ditches or gutters.

Impervious soils, such as clay and silt, result in a great amount of run-off as little water is absorbed by these soils. Sand and gravel, on the other hand, absorb great amounts of water resulting in little run-off. The conversion of a site from an agricultural land use, or a natural vegetation cover, to urban development often results in great changes in run-off quantity due to decreased ground absorption. Paved streets, buildings, parking lots, etc., are quite impervious to infiltration, therefore, most urban developments have a high "run-off coefficient". The run-off coefficient for a parcel of land is an expression of the amount of water falling on the surface that will not be absorbed. A development that will not absorb 90% of the water that falls on it has a "run-off coefficient" of .90. A "run-off coefficient" of .32 means that 32% of the water that falls on the area will be run-off. Soil types and land development variations result in variations in surface permeability which, in turn, result in variation in the quantity of run-off.

The greater the ground slope, the greater the run-off. In general, areas with slopes of from 10-30% have approximately 20% greater run-off than areas with slopes of from 0-9% grade, all other determinants of run-off quantity being equal. Areas of steep slope have increased run-off because the water is moving across the surface of the land too rapidly to be absorbed by the soil. Areas of no slope (0-1%) have ground drainage problems for the opposite reason; because there is no chance for the water to move, the soil is rapidly saturated resulting in standing pools. The optimum topographic condition for ground drainage is gently rolling hills which permit water to move slowly but continuously over the surface of the ground, thereby maximizing absorption potential while minimizing the possibility of surface erosion.

In general, therefore, if a proposed development or building is to be located on a long slope or hill, careful consideration should be given to constructing an earthen berm or other water diversion to direct water around the structure. The feasibility of constructing buildings on surrounding lands having slopes greater than 8% should probably be given careful engineering consideration to possible problems concerning erosion control, earth slides, drainage, vegetative cover, and special foundations or subsurface drainage systems to reduce possibility of economic losses.

Vegetation retards the flow of water over the surface of the ground, thereby increasing the potential for absorption, and making the ground more absorbent by opening up the soil through root growth. The heavier the vegetation, the lower the run-off coefficient, all other determinants of run-off quantity being equal.

Poorly drained areas will often control growth in such a manner as to leave them basically undeveloped until such time

as the economic demand for their intensive use is sufficient to absorb the increased cost of rectifying their defects through the application of drainage engineering technology. But, in the mean time, due to their low desirability, they tend to attract marginal developments requiring little construction, such as junk yards, storage yards, etc. This development usually leaves a social stigma of undesirability on the area long after the drainage condition is rectified.

Flood plain areas on the other hand present an opposite picture. Because of their relatively flat nature, the possibility of easy travel routes, and the accessibility to water supplies and sewage disposal areas, flood plains present an attractive site for development.

In brief, however, the problems of establishing permanent structures in relatively infrequently used natural drainage areas (flood plains) have much economic loss potential and should be carefully considered prior to land development. Potential land uses for such areas may be suggested in local flood control ordinances as well as in publications by the U.S. Water Resources Council.

Water & Sewer Utilities

GENERAL

The availability of an adequate water supply and a sanitary means of domestic and industrial waste disposal are two of the primary controlling considerations in development site planning. Until it can be well established that an acceptable water supply is available, or being planned at an economically feasible distance, and that provision has been made for the disposal of wastewater treatment effluents, major planning efforts should be delayed.

WATER SUPPLY

Influence of Water Supply on Development

The following six basic tenents define the overall influence of water supply on development.

1) Where a source of water supply does not exist, development will not occur. Where supply is limited, the degree of development will be limited to that population which the water supply can adequately serve.

2) Water quality can restrict development, particularly where sources are so polluted as to make them unpalatable, or if treatment is possible only at exorbitant expenditures. Such pollution may be natural or man-made.

3) Water trunks, mains and branches must be located well below the surface of the ground. If bedrock exists near the surface of the ground, the cost of excavation may be so great as to preclude water service or delay it until the demand for the use of the land is sufficient to justify the increased costs.

4) The available water pressure at house branches will limit the development of sites. If pressure is adequate to serve only two floors of housing, buildings higher than two stories will not be constructed unless there is economic justification for installing auxiliary pumps and storage.

5) Areas that are not served by a central water system must be served by individual wells. Groundwater sources may be so meager as to make individual well service impossible, resulting in non-development. Groundwater supplies are generally plentiful and of acceptable quality in this area of Florida.

6) Where not only individual wells but also individual sewerage systems (septic tanks and leeching fields) are necessary, only large lot, low density development will occur due to the need to physically separate septic fields and well heads for the prevention of contamination. Natural slopes are also required in such instances.

(C & RP 842)

Alternate Water Systems

To accomplish these ends, water service for a subdivision can be provided in many different ways. The method most preferred is the extension of existing water and sewer lines. If the development is not located within an existing service district, water and other facilities may become available through annexation by a local municipality. Another alternative is the formation of an improvement district or utility corporation where existing laws allow. Where a regional or county service district or authority exists, such as the Gainesville-Alachua County Regional Electric, Water and Sewer Utility Board, the authority becomes the controlling agency. If a public water or sewer system is not available, the developer has the option of developing his own utility system, including collection, distribution, and treatment systems.

The two major categories of water supply are groundwater and surface water. Two sources of supply of relatively minor importance are rainwater and demineralized water. Groundwater supplies include dug, bored, driven and drilled wells, springs, and infiltration galleries. Surface water supplies include lakes, streams, reservoirs, ponds, swamps, and rivers.

In general, when it is necessary to develop a central water system to serve a subdivision, primary consideration should first be given to a groundwater supply. Groundwater sources are generally superior to surface water supplies in that they are usually biologically pure, fairly constant in quality, quantity and temperature, and often have less turbidity and color than surface waters. Simple chlorination treatment will normally provide an adequate safety factor for such supplies.

The location and utilization of groundwater supplies should take into consideration the recharge area, possible sources of pollution, well construction practices and standards actually followed, and engineering evaluation of safe yield and well field design.

Surface water supplies by their very nature are all subject to intermittent pollution and almost invariably must be treated to insure their safety. The extent of required treatment of any water supply will necessarily depend upon the findings of a sanitary survey by a competent sanitary engineer. The minimum treatment required may be simple chlorination, or a more thorough treatment process involving coagulation, sedementation, filtration and chlorination to improve water quality. Where a surface supply must be relied upon, a reservoir or lake with good water management policies and control that does not receive domestic or industrial sewage is preferable to a stream or river.

The Water Supply System

The water supply system differs from the gravity systems of storm and sanitary sewers in that the water supply piping system is a pressurized system. Because of this, the location of the water supply pipes is not dependent on terrain and should not be a linear-branched system. The water supply piping system serving a residential area should be a grid or looped system. Such systems minimize the potential for the freezing of

water in deadend water lines, reduce the pressure drop at end-of-the-line locations during periods of high water demand, and permit sections of water pipe to be cut out of service for repair purposes, or the addition of taps to the line, without disruption water service to the users beyond.

In general then, it may be stated that any public water supply, to adequately serve its demands, must have a distribution system of sufficient capacity to meet maximum demands of projected maximum daily flows plus an added fire flow capacity. There should be a provision for stage expansions, and the system should be able to maintain a minimum pressure of 40 pounds per square inch everywhere within the service area. The system should have sufficient quantity for projected growth plus a reserve for dry periods. In addition, water quality must meet with U.S. Public Health Standards.

Water Supply Planning Considerations

There are many situations where there is no practical alternative to the use of streams for water supply. In such cases, carefully designed water treatment plants should be provided. The quantity of water upon which to base the design of a water system should be determined during the preliminary design stage of the development. Population projections are the basic considerations when estimating future water demand; however, social, economic, and land use factors, all of which can be expected to change with time, should be considered. For general estimating purposes the average community requires approximately 150 gallons of water per day per person. However, the actual distribution system must be designed to deliver adequate water to meet peak hourly demands, which in small communities and subdivisions may reach 500 to 1000 percent of the average daily consumption, and a fire flow demand capacity which may even

exceed peak hourly demand in smaller communities. The total quantity of water used for fire fighting is normally quite small, but the demand rate is high. Wide individual variations exist for water supply requirements. It is, therefore, necessary to employ a competent sanitary engineer to consider all design requirements during the planning and design stages of development.

Several of the more important factors that influence water demand include climate, degree of industrialization, type of service, lawn sprinkling, air conditioning, cost, water pressure and quality. Lawn sprinkling and air conditioning have been an increasingly important cause for rising per capita use of water in Florida.

In the selection of a source of water, the various factors to be considered are adequacy and reliability, cost, quality, politics and legal implications. Of these, cost is probably the most important because with modern techniques almost any source could be utilized if consumers were willing to accept the price. In some local areas, such as certain areas in coastal Florida, existing demands exceed the capacity of supplies and increasing attention has been directed toward desalinization and reclamation of wastewater.

Adequacy of supply requires that the source capacity should be large enough to satisfy the entire water demand. However, total dependence on a single source is not always desirable, and in some cases, diversification is essential for reliability. The source must also be adequate for meeting the demands during power failures and natural or man-made disasters.

A political problem with water supply sometimes exists because political boundaries seldom conform to natural-drainage boundaries. This problem is especially acute in extensive water-

importation plans; but it even exists in varying forms for wastewater reclamation and desalination projects. Legal advice should be sought prior to any large scale water usages.

Wastewater reclamation for human consumption is not yet an acceptable alternative as determined by the United States Public Health Service. Hindered by public opinion and uncertainty over the persistence of viruses, such reuse is, for the most part, currently limited to irrigation and other miscellaneous uses where human contact and consumption is circumvented.

SANITARY SEWER SYSTEMS

Influence of Sanitary Sewer Systems on Development

Like water supply, the presence or absence of an adequate means of sanitary sewage disposal has a major influence upon the type and degree of development in an area.

There are six limiting influences of major effect that generally define the impact of sanitary sewer systems.

1) Where a natural drainage channel with continuous stream flow does not exist and soils are primarily not permeable, the disposal of treated effluent is a serious problem. Most treatment facilities depend heavily on dilution of the discharged effluent in stream flow of a natural channel, or on the absorption of the effluent into the ground. Where neither of these methods is practical, a higher degree of waste treatment will be necessary and a more elaborate means of effluent disposal required. This involves an expense that can seldom be accepted by smaller communities and may preclude additional development.

2) The location of the treatment plant and point of discharge has a great effect on development form. Since the sewer system is a gravity system, only areas above the level of the treatment facility can be served. Because the discharged

effluent is not 100% pure or safe, treatment facilities and discharge points must be located downstream or downslope from the areas which they serve, minimizing the influence of potentially polluted stream flow on developed areas. Treatment plants are also commonly odor creators, and their location, relative to prevailing winds and residential and commercial areas, is an important planning consideration.

3) Sewer lines must be laid separate from water lines and no sewer invert (inside bottom of pipe) should be less than four feet beneath the finished street grade.

4) Sewer service depends on a constant downhill slope. Therefore, not only areas below the level of treatment facility will be denied service but also those areas so far from the facility that a reasonable sloped sewer cannot be provided, except when it is economically justifiable to pump sewage to higher elevations by the use of lift stations or to transport it under pressure by pumping.

5) Areas that cannot be served by a central sewer system must be served by individual septic tank systems or by small satellite sewer plants. Such small plants can economically serve 75 to 500 dwelling units and must meet all the requirements of a central system. Where these requirements cannot be met and the slope/soil characteristics of an area are not acceptable for septic tank performance, the area will not be developed.

6) Although an area may be served by sewer lines, it may be strongly inhibited in its development by the capacity of the sewer pipes which have been provided. Particular uses may be precluded on particular sites by inadequate sewer lines.

(C & RP 842)

The Sanitary Sewage Collection System

The central sewerage system for a residential area consists of straight sanitary sewer pipe sections connected by manholes at every change of horizontal and/or vertical direction. The pipes must have a continuous downgrade from the highest point on the pipe system to the point at which it empties into a

sewer at the fringe of the residential area leading to the treatment plant. The sanitary sewerage system is usually a branching system where the smallest branches are attached to house sewer lines that carry sewage from residential fixtures into the sanitary sewer lines.

Each dwelling unit in a residential development to be served by a central sewer system must have a direct connection with a sanitary sewer located either in the public street right-of-way or on a private land in an easement. For general planning purposes, it can reasonably be assumed that house sewers will be six inches in diameter, and all others will be a minimum of eight inches in diameter. Sanitary sewer pipes must be laid with their invert elevations at least four feet below the surface of the ground or lower where basement fixtures are to drain into them. Manholes must be provided, at least at 400-foot intervals, along sanitary sewer lines. The minimum slope of a sanitary sewer is .4% for the first 1,600 feet upgrade of a controlling sewer and a .3% grade below. Sanitary sewer pipes are usually only constructed of vitrified clay in Florida.

Alternate Sanitary Sewerage Systems

Where a public system is not available, the design of a central sewerage system including a treatment plant should be given careful consideration.

Where such a central sewerage system is located, lots can be made smaller than if a septic tank and well were installed on each lot. The cost of sewers per dwelling can be reduced if a central system is installed at the onset of construction. In addition to producing more lots, the installation of such a system makes the property more desirable, a better investment,

and less likely to cause a public health nuisance than potentially troublesome septic tank systems.

Various treatment methods are available by which wastes from a subdivision may be treated. The actual method employed will depend upon the number of persons to be served, the degree of treatment required, the type of supervision provided, and other qualifying criteria. For the small development of up to 50 homes, the package type extended aeration plant has been found practical and has been increasingly utilized in recent years. This system employs the principle of continuous aeration for periods up to and exceeding 24 hours for all wastes to accomplish biologic degradation of the incoming organic matter. For housing developments up to about 300 homes, other types of package treatment plants employing the basic activated sludge process of organic degradation by aeration are supplanting the older Imhoff tank and sand filter methods. (Larger subdivisions usually construct more permanent treatment plants that utilize some modification of the basic activated sludge-type plant.) All wastewater plant effluents are presently required to have chlorination for disinfection purposes prior to final disposal.

Planning Considerations for Domestic Wastewater Disposal

In rural areas remote from population centers and their accompanying public water and sewer services, individual well water and septic tank sewage disposal systems offer the only practical answer for at least the immediate future. Like public facilities, for individual systems to be acceptable, they must be carefully designed, constructed, and maintained in accordance with good standards. In areas where the soil is unsuitable for disposal by the conventional septic tank systems, every effort should be made to prevent the subdivision of land until a public sewer system can be made available. In addition,

the development of private residential sewer and water systems should not be permitted in areas where there is a high probability of extensive urban development at locations beyond the area being subdivided, unless the residential street system and lot pattern are designed to permit the resubdivision of the area after central, public utilities are extended through the area to serve the developments beyond. Private, individual water and utility provisions usually require large residential lots which become unnecessary and expensive when central, public utility systems are extended to serve these sites.

The following points illustrate the general system requirements corresponding with the various possible combinations of available public services on the density of development.

1) Private, individual sewer: central, public water. Where individual sewer systems are developed, "septic" tank systems serving each residence on its own site, and where public water supply is provided to residential sites, net residential density usually can be no greater than 4DU (density units)/acre. This condition results from the need for at least 50 feet between any part of the septic tank system and any dwelling unit on the same property or on adjacent property.

2) Private, individual sewer: private, individual water. Where both sewer and water systems are provided on-site for each dwelling unit via septic tanks and wells, net residential density can be no greater than 2 DU/acre, and may have to be much lower. This condition results from the need for at least 50 feet between any part of the septic tank/ septic field system and any dwelling unit, in combination with the need for at least 100 feet between any part of the septic system and the nearest well. But, where sandy soils exist this distance should be increased to 250 feet. In addition, the wells on each site must be uphill from the septic system on the site.

3) Central, public sewer: private, individual water. Where sewer service is provided to dwelling units by way of a central sewer system, but water is provided at each dwelling unit by individual wells,

there are no more limitations on residential development than there are when both water and sewer are under a central, public operation.

(C & RP 842)

The determination of service areas should be based upon population density and topography. A comparison of the map of the subdivision to be served with the topographic maps used in drainage analysis and a soil map will be helpful in determining:

1) the most logical service areas and sites for locating treatment plants; and
2) areas which, because of poor soil conditions, are in most need of public sewerage.

When designing a sewerage system for an area, adequate master planning should go a long way towards reducing long-range problems. It is not very practical or efficient to allow or provide for a number of small treatment plants each designed to serve only its immediate area. This practice indicates a lack of coordinated planning and is quite often considerably more expensive than the construction and operation of a few large waste treatment facilities each designed to serve a major drainage area.

It is essential that every planned sewerage system have a built-in flexibility which provides for future expansions. This can be accomplished by designing sewer pipes to accommodate both present and future needs and by designing the treatment plant to allow the additional treatment units to be added as required in future years. It is common engineering practice to design pipes for a period of 40 to 50 years, treatment plants for 15 to 25 years, at a per capita flow of 100 g.p.d. plus major industrial wastes, and certain trunk sewers for the life of the system.

As is provided for in tne sub-division regulations for Alachua County, mandatory connection to the central sewer system should be required as soon as the system is available to potential customers. This allows for better system planning and insures customers to meet the economic requirements of constructing and maintaining the system. At the time such provisions are made, a definite distance requirement should be established to determine connection responsibility and/or a time factor may be designated limiting the time within which a building must be connected to the public sewer system. Other arrangements are possible, and having one such requirement is highly desirable.

LOCATION OF UTILITY LINES

Sanitary sewers are generally located along road centerlines. This location positions the pipe equidistant from building lines on either side of the street facilitating house connections and prevents the incidence of root damage occuring to pipes if they are located in planting strips next to pavements. Water lines may be located under the street pavement or alongside the road under the sidewalk or planting strip, but they should be located at least ten feet from the nearest sewer or gas main and above the highest sewer or gas lines. Storm sewer pipes are usually located on the opposite side of the road from water lines. (Chiara and Koppleman, p. 294)

APPENDIX A

METHODOLOGY FOR PROJECTING HOUSING NEEDS

All projections of housing needs are based on population projections for the respective areas, as reported in the Population and Economic Study (N.C.F.R.P.C., 1972). Trend data was employed when available with regard to population per household and housing type and tenure. When such trend data was not available, rates and values were held constant at the 1970 level as reported in the Census Summary Tape Printouts. Vacancy rates were held at the 1970 level except for the Gainesville Urban Area, where the average vacancy rate from 1950 to 1970 was computed and continued forward throughout the study period.

As no trend data exists for the unincorporated areas of the county, data for these areas was held constant at the 1971-72 level, as identified in the Housing Conditions Study (N.C.F.R.P.C., 1972).

The following procedure was used to arrive at housing needs figures:

1) Total projected population multiplied by the percent of the population estimated not to be in group quarters yields the population residing in households

2) Population residing in households divided by the estimated population per household yields the estimated number of occupied housing units

3) The number of occupied housing units divided by 100 minus the vacancy rate yields the projected total number of housing units needed

Total housing unit figures were then subdivided by category by type and tenure. Summing the totals by category for each study area resulted in the totals for Alachua County.

APPENDIX B
METHODOLOGY FOR PROJECTING COSTS OF NEW HOUSING

1. The price of a typical residential unit in Alachua County was provided by the Home Builders Association of Gainesville. The typical residential unit was described as a 3 bedroom house with approximately 1,200 square feet of living space, on a standard 100' by 100' lot.

2. A survey of builders indicates that lot prices will vary according to lot size, degree of development and geographic location the range may be from \$3,000 for a lot with no accompanying paved streets, curbs or street drains, to as much as \$12,000 for one--third of an acre in a subdivision. For the purposes of this study a cost figure of \$5,000 for a standard lot accompanying a typical residential unit will be used. This represents 20% of the total cost of the house.

3. Data from the Home Builders Association indicate that land accompanying the typical residential unit in 1963 cost approximately \$2,000. Using this as a base figure, calculating the per cent increase from 1963 to 1973 and projecting this forward to 1985, estimates of land prices were determined for 1975, 1980 and 1985.

4. Maintaining the distribution of housing costs alluded to earlier, dividing the estimated cost of land by .20 yields the estimated total sales price of a new house for each respective year.

NOTE: Prices may vary according with the addition of household luxuries, size of lot, degree of lot development, square footage of house and geographic location.

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